UNITED STATES ARMY

DECEMBER 1969

# AVIATION DIGEST

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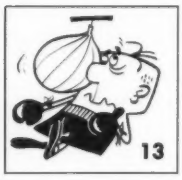

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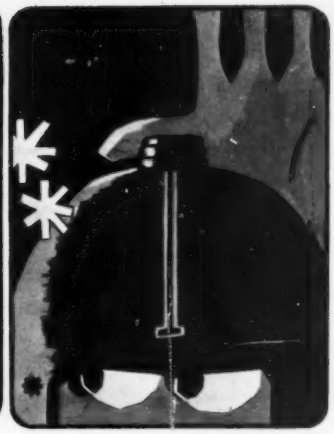
# VIEWS FROM READERS



AIR TRAFFIC controllers often are called the "unsung heroes of modern aviation." They are responsible for the safe, orderly movement of aircraft through crowded skies. Without them, busy airports would be a hopeless mess. Many pilots have had a controller take them by the hand, so to speak, and lead them to a safe landing during an emergency.

Often the controller is in a position to see mistakes being made or areas in which there can be improvement. Here is a letter from Douglas D. East who is a Department of the Army Civilian and chief controller at Simmons Army Aviation Command with a case in point.

Sir:

Special VFR operations are one of the most abused situations encountered today. With proper preflight planning, however, this abuse can be eliminated. A recent event at one Army airfield bears this out. The local weather station was carrying the following weather: 500 thin scattered, 1½ miles visibility with ground fog. A flight of two UH-1Ds was given this weather by the control tower and the pilots requested a special VFR clearance out of the control zone.

The control tower obtained the following clearance from approach control and delivered it to the pilots: "Cleared out of the control zone 5 miles west; maintain special VFR flight at or below 2,000 while in the control zone; report leaving the control zone."

Approximately 3 miles west of the airport the flight entered an overcast condition and was forced to proceed on actual instruments. Approach control broke up the flight and vectored the aircraft back to the airport for a GCA approach. The first aircraft landed without incident but the pilot of the second aircraft encountered vertigo.

The vertigo was detected by an alert GCA final controller who continued the run as a no gyro approach and got the aircraft safely on the ground.

This flight which might have ended in disaster could have been averted if these aviators used preflight planning and forethought.

First, consider the reported weather and how the weather briefing was obtained. The unit operations officer has an electrowriter used for local weather dissemination. The weather observer was carrying 500 thin scattered, which was directly over the airport. The forecaster was not called, so this was the limit of the weather briefing. How did this pilot know that he could maintain proper VFR flight once clear of the control zone? After all, isn't the intent of a special VFR clearance to transition from local weather phenomena to a point where proper VFR flight can be accomplished?

Secondly, what plan of action did the pilot have in mind in event VFR flight rules could not be met? Were approach plates and charts in the aircraft? How current was the aviator in instrument flight? Although an instrument rating is not required for special VFR flight, odds are this is where it ends up.

Finally, consider whether or not the mission is essential. Is it worth risking life and property or does it boil down to trying to meet minimums?

By following the above hints and leaving complacency at home, one can have a successful special VFR flight in a safe and professional manner.

• You have a good point there, Mr. East. Let's paint these pilots green with inexperience—perhaps recent Vietnam returnees who haven't yet had an instrument check ride or a crack at the annual writ.

★ ★ ★

The 165th Aviation Det. at Qui Nhon writes that their seven Vietnamese civilians who have been training as air traffic controllers are now taking on-the-job training (OJT). They have already completed 120 hours of classroom instruction.

The Vietnamese attained proficiency first in the written areas of controlling as is the custom in U. S. Army schools in the United States. This enables them to devote their full time to practical experience in the OJT phase of their training. Until full turnover to the Vietnamese is made, one or more U. S. Army personnel remains on duty in the tower to provide occasionally needed assistance.

★ ★ ★

The Army Transportation School at Ft. Eustis, Va., informs us that they are training another group of Vietnamese. These are Air Force personnel who are being trained in aviation maintenance. Three classes graduated in September and two more classes are scheduled to graduate early this month. By the middle of December 157 students will have graduated.

*Continued on page 35*

# The Demand For The Warrant

EIGHTY-EIGHT warrant officers are enjoying the sensation of being some of the most sought after men in the Army today. They are the students of Intermediate Class 70-1 in the Aviation Warrant Officer Career Development Program who will be graduated this month at Ft. Rucker, Ala.

Class members are receiving orders now and indications are that there are more top level jobs open than there are graduates to fill them.

Another class of 32 warrant officers also are in demand to fill still higher level positions. These are members of the Advanced Career Class 70-1. This elite group of warrant officers will be graduated in February.

Upon graduation, the intermediate class will have received 684 hours of academic instruction in a little over 22 weeks. The advanced class will have received 759 hours of academic instruction in just over 23 weeks.

The two classes will receive 422 common hours of instruction. Although the warrant officers attending the two initial courses are receiving like instruction in some subject areas, this will be changed by the time students in the intermediate courses return in future years to attend advanced classes.

Instruction is being handled by all teaching divisions of the Department of Special Aviation Training. The General Military Subjects and Aviation/Safety Branches are giving the intermediate class 42 hours of safety subjects, 170 hours of aviation and aviation related subjects, 86 hours of Army maintenance management and 117 hours of general subject instruction. These branches also provide the advanced class 102 hours of aviation safety subjects, 125 hours of aviation related subjects, 89 hours of maintenance management and 101 hours of general subjects. General subjects include CBR, leadership and methods of instruction, communication and many others.

The Combined Arms and Special Operations Branches are administering the intermediate class 268 hours of instruction and the advanced class 221 hours. Subject matter includes services, organization; staff principles; offensive, defensive, and retrograde operations; and armed/cavalry, internal defense/counterguerilla, airmobile and artillery operations.

The Air Traffic Control Division does not teach the intermediate class but gives the advanced class 124 hours of instruction. Communications, airport traffic control, enroute traffic control and ground control approach are some of the subjects taught by this branch.

As a result of its 102 hours of aviation safety, advanced class graduates will receive an MOS equal to that given by the Aviation Safety School of the University of Southern California. This will make the warrant eligible for top aviation safety assignments. Since those in the intermediate class get only 42 hours of safety subjects, they are not eligible for the special safety MOS. However, they will leave the school with an above average knowledge of aviation safety and will qualify as unit safety or assistant safety officers.

It was originally planned for the warrant officers to receive a wide variety of aircraft qualification training. For various reason, mainly scheduling, it proved impossible to give this training while the course was in progress. Plans call for students to get transition training later. In the future some will attend special flight training prior to attending the school.

Each member of the course has been asked to complete an assignment preference sheet for use by the Office of Personnel Directorate (OPD). A representative of OPD also visits the students at Ft. Rucker to help emphasize the true value of the training they are being given and to provide career counseling to the students.

OPD is enthusiastic over the potential of the graduates. It is felt that the warrants' overall technical skill will be greatly enhanced by their schooling and that they will have a general education equal to the command and general staff and senior college level. It is anticipated that the warrant officer graduate will assume much greater responsibility in various staff agencies.

Another intriguing possibility is that the graduate could become a sort of "super specialist." Some of those selected for assignment to the Federal Aviation Administration, U.S. Army Board for Aviation Accident Research and other like agencies could stay with the same unit for the rest of their Army careers. They would be transferred to various posts and stations and even overseas but would remain with the same agency.

What types of assignment the members of the class can expect is revealed by assignments now being offered. Most students have re-

ceived the assignments they requested—those that are most coveted by warrant officers.

In the intermediate class, 25 will transition into fixed wing aircraft before being sent to other assignments; 22 have been assigned to Ft. Rucker; 8 are going to various FAA Flight Service Stations; 12 to the U.S. Army Aviation Systems Command (AVSCOM); 1 to the Army Flight Detachment in Washington; 10 to Europe; 2 to the Aeronautical Depot Maintenance Center, Corpus Christi, Tex.; and 1 to the Lockheed Aircraft Company.

In the advanced class, 4 students have assignments to FAA centers, 6 to various Army headquarters, 9 are going to AVSCOM and 2 to USABAAR. Two more will go to the U.S. Army Test Board and 2 have been assigned to the DA Warrant Officers Career Development Program.

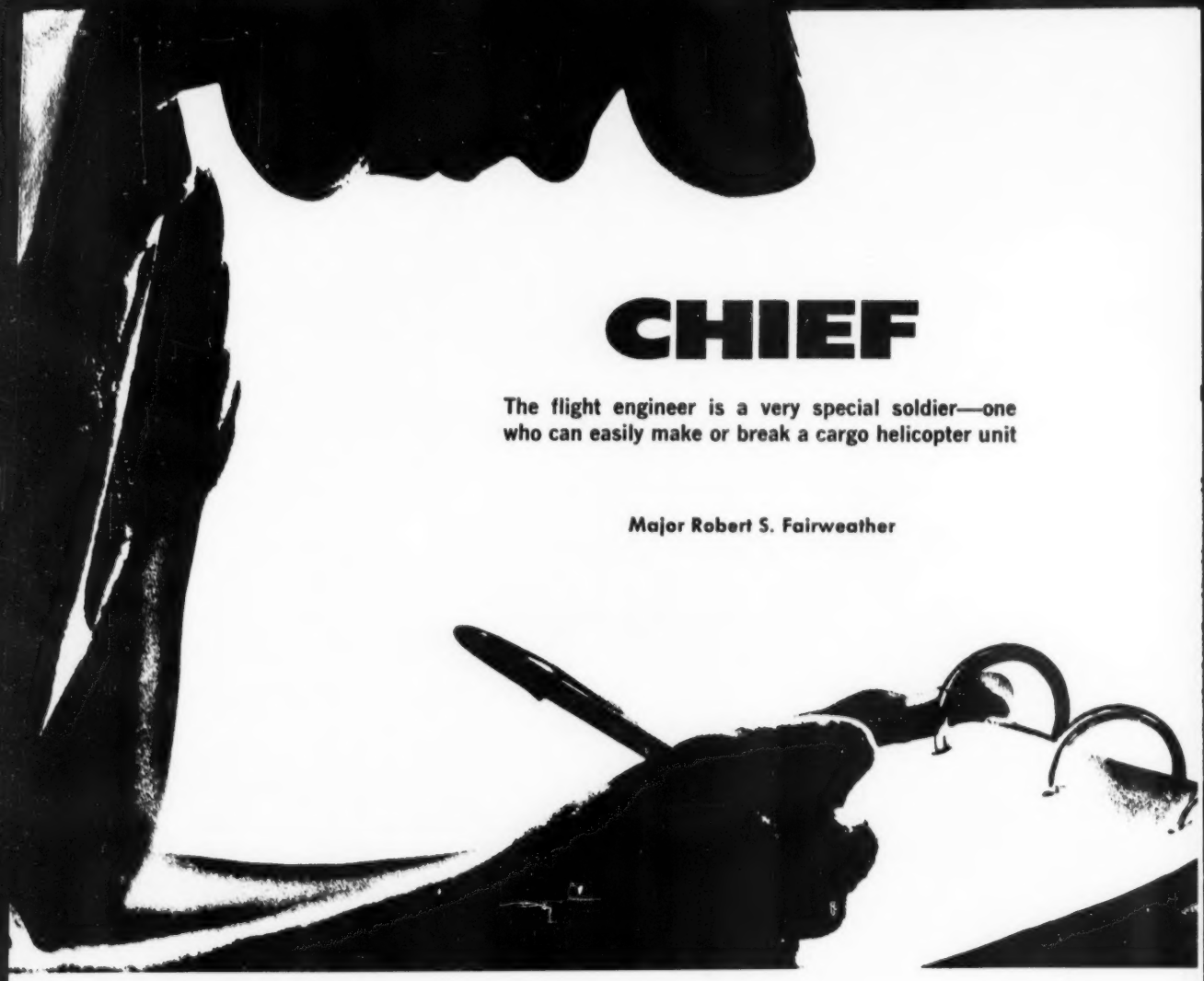
The graduates of the two courses are urged to apply for one of the 1640 regular warrants now available to warrant officers. The chief of the Aviation Warrant Officer Career Branch in Washington spoke to the two classes shortly after they were formed to explain the advantages regulars have over the non-regulars. He said that among those graduating from one of the courses, the regulars would get preferential assignments and school attendance.

OPD is screening the records of all warrant officers to find those most qualified to attend future career courses. Warrant officers do not need to apply to be selected but can if they wish. Application should be made on Personnel Action Forms (DA Form 1049).

Intermediate Course 70-2 starts 26 Jan 1970 and ends 2 Jun 1970; 71-1 starts 27 Jul 1970 and ends 15 Jan 1971; and 71-2 starts 26 Jan 1971 and ends 2 Jul 1971.

Advanced Course 70-2 starts 19 Jan 1970 and ends 2 Jul 1970; 71-1 starts 22 Jul 1970 and ends 15 Jan 1971; and 71-2 starts 19 Jan 1971 and ends 2 Jul 1971.

For the time being 100 warrant officers will be enrolled in each class of the intermediate course and 50 in the advance course. If personnel requirements for the Vietnam conflict are deceased, the number of warrant officers enrolled in each class will be increased.



# CHIEF

**The flight engineer is a very special soldier—one who can easily make or break a cargo helicopter unit**

**Major Robert S. Fairweather**

DARK SUDDENLY surpassed the dying day and with it came the drenching rains from a now hidden thunderstorm. The time was ideal for the enemy to press home his advantage from an earlier attack against the cavalry troop whose ammunition was running low.

A call was put out for ammunition. A CH-47 would be needed to move the required amount of ammunition within the short time available, so the mission went to the 200th Assault Support Helicopter Company: the Pachyderms. With speed to match the situation, a crew was quickly rounded up, and minutes later a Chinook was on its way through the unfriendly sky to the PZ (pickup zone).

Upon arrival, the aircraft was landed, coordination was effected and the first slingload hookup was made. The aircraft then proceeded to the LZ (landing zone) where the load was deposited inside the troop perimeter. One more sortie was made and two KIAs were returned to the PZ. By this time weather had deteriorated to the extent that no further flight could be attempted. The crew slept in the aircraft until morning, and then carried the last load to the unit at first light.

The mission had been accomplished because of total crew effort. One of the crewmembers was a young, but combat-experienced sky soldier from Nebraska. Work-

ing under adverse conditions of night marginal weather in an atmosphere of constant enemy and friendly fire, he operated with efficiency and skill. Preparing the ship for flight in minimum time, managing the enlisted crew, performing the slingload operations with a flashlight, clearing the aircraft into an unprepared LZ and directing the loading of the KIAs he proved once again the professional dedication of those who make or break a cargo helicopter unit—the flight engineers.

What does the flight engineer do? His daily routine is rough. Up at 0415 hours for a 0630 takeoff, he hurriedly eats breakfast and then, with his crew, starts the preflight. Engine covers and tiedowns are removed, oil levels are checked and lines and fittings are examined for leaks. The windshields are cleaned, the weapons and ammo mounted, the water cans filled and any special equipment is put aboard.

When the pilots arrive, the aircraft hatches are opened for preflight inspection. The flight engineer accompanies the pilots to answer questions or initiate required maintenance.

The flight engineer, often called "chief" by the pilots, is greatly respected by the aviators. Many times the decision as to whether a maintenance fault is or isn't hazardous to flight rests on the "chief's" shoulders. In addition, he is responsible for the performance

of the other two enlisted crewmembers and must insure that they are qualified to serve in their positions. In emergencies, such as engine fires, he must react immediately and correctly or the entire aircraft and crew are jeopardized.

The daily routine of the Chinook is usually varied and cargo comes in all sizes and shapes. The flight engineer depends on the aircraft commander's preflight briefing in order to organize the cargo compartment for the day's operation. He must be ready for external loads and at the same time be prepared to accept internal loads, which can consist of such items as live water buffalo, trussed pigs, mermite cans, lumber, steaks, rice bags, generators, howitzer tubes, field portable toilets, ice and a thousand other items essential to combat.

Slingloading operations require much skill and judgment and the "chief" must direct the pilot over the load, insuring that each direction and dimension is timed just right to include pilot reaction time. As the hookup is made, the flight engineer must make a rapid judgment as to the condition and rigging of the load to prevent the pilot from lifting one that is improperly prepared.

As the flight progresses, the chief must continually inform the pilot as to the aerodynamic characteristics of the load and be ready to release it in an emergency. Upon landing, he must again direct the pilot for proper placement and then insure that the load is released from the hook. Many ground pounders are prone to stand in front of the Chinook waving directions to the pilot, never realizing that the flight engineer is actually directing the aircraft over the hookup or release point.

Internal loads, oddly enough, are usually more difficult to handle. The average PZ or LZ is a natural obstacle course designed with stumps to puncture the underside skin of the aircraft, trees or antennas to recontour the blades, mud holes deep enough to float the USS Enterprise and with all manner of rotorwash agitated flying debris. The flight engineer, coordinating with the gunners, must insure clearance from these obstacles and yet prevent undue delay in the landing of the aircraft. Then the fun starts because the ground crews are anxious to start loading, and sometimes in a carried-away state of enthusiasm, they heave items such as mortar tubes or tank generators on the floor and watch in surprise as they go right through the alloy floor covering.

Sometimes the loading crews are non-English speaking Montagnards with pierced earlobes dressed in the latest style loincloths. At any rate, the chief must be prepared for any situation and cut loading and unloading time down to a minimum so that aircraft utilization is not wasted.

There are so many things that flight engineers run into during the course of a day. Lord mounts fail, oil leaks develop, the enemy takes potshots, members of the crew receive minor cuts or burns that require first aid, gas hoses slip—covering the unlucky refueler with JP4 (requiring an immediate strip of clothing and thorough washing of the body)—the pilots need a cup of water brought to the cockpit, hotrod jeep drivers charge the ramp with great speed but poor control and proceed to redesign the cargo compartment interior (fortunately, a revised unit SOP eliminated that headache), passengers get sick, soldiers inadvertently drop grenades and a host of similar events which would drive a lesser man to despair.

The chief's day does not end when the average six to eight hours of flight time are completed. He, along with his fellow crewchiefs, must then conduct a postflight inspection, clean the aircraft, perform the daily inspection and wrap the ship up for the night. After a late supper, a relaxing shower and a letter to the wife, there is little time or desire for anything but some well-earned sleep.

The Chinook is a big helicopter and it demands big efforts. To keep it maintained, to keep it armed and to keep it functioning in its cargo role, aggressive and hard-working men are needed.

The flight engineer is not a god or a superman. However, he is a key man on the crew of a cargo helicopter and is chosen for ability, judgment and dedication. He can take pride in the role that he and his contemporaries play in assuring timely delivery of essential cargo to combat ground units. He has proven himself and earns the respect of all who serve with him.

**Maintaining a lonely vigil at night in the skies over the Delta, the O-1 pilot exercises his visual purple to its limit. Visual purple?—a chemical substance which aids in transmitting light to the retina**

# EXERCISE IN VISUAL PURPLE

**Captain Clark D. Hein**

MUCH HAS BEEN written describing the various missions performed by the O-1 Bird Dog in the Republic of Vietnam, but little has been said concerning the thousands of hours of night flying performed each year by O-1 pilots.

Whether or not an aviator might have the opportunity to amass several hundred O-1 hours

# Exercise In Visual Purple

of night combat time depends largely upon the corps area to which he is assigned.

During nine months of Bird Dogging in Vietnam, I had the opportunity to fly missions in three corps areas. I soon discovered that night missions in the mountainous areas of central and northern Vietnam were the exception rather than the rule. The rugged terrain makes night flying at relatively low altitudes both difficult and dangerous. However, if you are assigned to a reconnaissance airplane company in the Delta or in southern II Corps, you can expect to become well acquainted with the rudiments of night flying.

Assigned to an O-1 company in Tay Ninh Province, approximately 50 miles northwest of Saigon, I had the opportunity to fly many varied night missions.

The most common night mission flown by our unit was a mortar watch. This type mission required one or more aircraft to maintain surveillance above one of the American base camps in the area during the hours of darkness. It was found that the Viet Cong seldom launched a mortar or rocket attack as long as an O-1 was orbiting.

These missions usually required the pilot to report to the supported unit just before dark to receive a briefing covering the enemy situation, where friendly artillery would be firing during the night and coordination in the event of an attack. The briefing completed, the pilot and his observer, if one was available, would become airborne at last light.

Other than the lights of the base camp, there was little to be seen from altitude. The perimeter lights of the camp vividly betrayed its boundaries but beyond was complete darkness. The mission of the pilot and observer was to detect enemy fire directed against the American compound and to take immediate steps to neutralize it.

This may sound like an impossible mission for an unarmed O-1 aircraft but in many instances it was carried out very successfully. The success of such a mission depends greatly on the individual skill and proficiency of the pilot.

Detection of enemy fire at night, whether it be rocket mortar or recoilless rifle, can be made quickest with the naked eye; the sound of an incoming shell or its blip on a radar scope are preceded by a flash which can be readily seen from air. This is why the O-1 has become such an asset to early detection of enemy attacks at night.

Since most of Vietnam outside the heavily populated areas and allied compounds is virtually blacked out at night, a muzzle flash can only mean enemy fire. An O-1 orbiting several thousand feet above a friendly position at night can easily detect any enemy fire in the immediate area.

However, detection is only the initial step in successfully completing the mission. Many methods have been tried to neutralize this enemy fire, but to my knowledge none have been as successful as the adjustment of artillery by an aerial observer. Although not a new tactic, it nevertheless takes a great deal of skill and technique to be able to conduct a fire mission successfully at night. Mentioning some of the problems involved will give an insight into the difficulties one may expect to encounter.

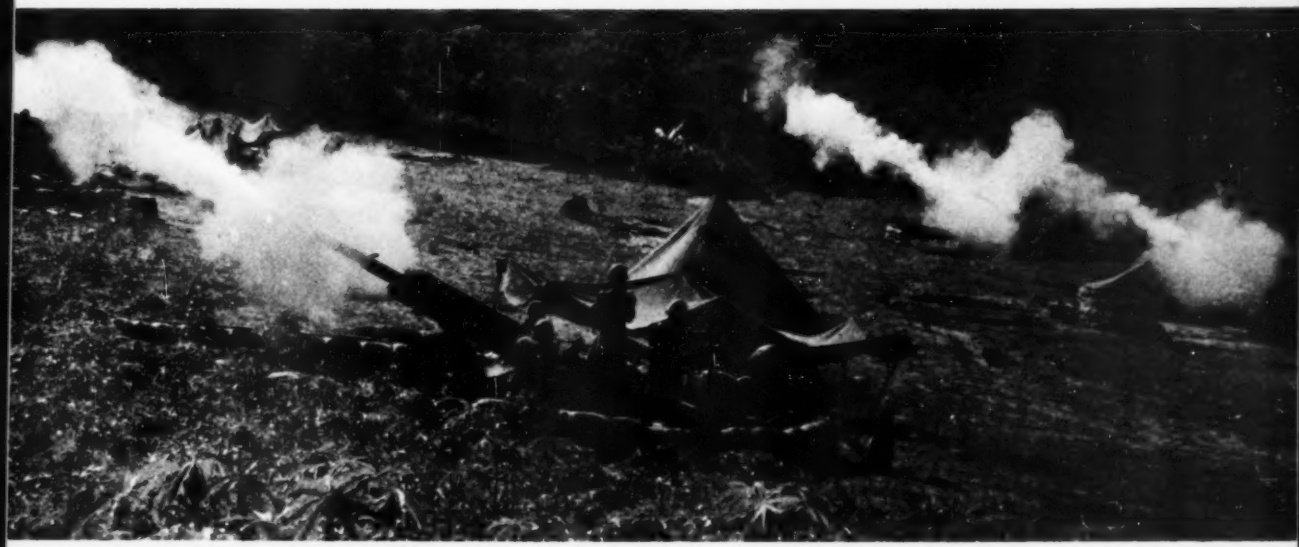
Unless enemy fire is continuous it is very difficult to accurately plot the position of enemy guns at night. A muzzle flash lasts only for a fraction of a second and then is gone. Also, unless it is an extremely bright night the aerial observer cannot see enough detail on the ground to accurately plot eight digit coordinates on his map. Even if the correct location of the enemy is determined, first round hits are rare and the man in the air must then adjust the fires onto the target. Without visual reference to a gun target line on the ground this becomes a haphazard, expensive proposition.

The best way to offset this problem is to be completely familiar with the surrounding terrain, an accomplishment which the pilot and observer should have achieved from many hours of daytime missions. This will greatly enhance the ability to plot reasonably accurate coordinates at night.

Often in the flat regions of Vietnam prominent terrain features are completely lacking and other methods must be used to locate enemy positions. Our unit made good use of flares carried beneath the wings of the aircraft and released by a switch in the cockpit to pinpoint enemy positions at night. This was much quicker than calling for artillery illumination rounds and enabled the pilot to focus his entire attention on fixing the target.

Usually the two flares carried by the aircraft gave sufficient light to initially plot enemy gun positions. Once the positions were plotted, a fire mission could be called against them and another method of illumination could be employed to provide the aerial observer with the visual reference needed to adjust his rounds on target. This could be accomplished by calling for illumination rounds at evenly spaced intervals between explosive shells or by having one gun shoot continuous illumination over the target area.

Illumination of enemy targets at night and accurate return fire were the dominant factors which limited the effectiveness of enemy mortar and rocket attacks.



Artillery is one of the most effective weapons available to the aerial observer

Our unit encountered other night missions which, although not as involved as the mortar watch, were no less important. One of these which I had the opportunity to fly involved the night withdrawal of a mechanized Infantry brigade from a forward base to a secure area more than 60 miles away. The command and control problems involved in such a move over unimproved roads at night are numerous to say the least.

The brigade commander chose to control his column from the back seat of a Bird Dog at 2,000 feet. With the aid of the pilot and two FM radios, the commander was in complete control of his column at all times. Several of the vehicles in the column, including the lead and trail vehicles, possessed strobe lights which were activated on command from the circling O-1.

The commander also regulated the convoy interval through commands to the various lighted vehicles and, by flying ahead and dropping flares, to indicate the route to be followed. The entire move was accomplished during the hours of darkness without incident.

Another night mission which was often required of our unit was that of radio relay. It did not demand a great deal of skill or use of special techniques on the part of the pilot, but was extremely difficult because of the long hours of relative inactivity involved and the fact that it was almost always flown without an observer. It was the responsibility of the pilot to maintain the only continuous radio contact between a unit on the ground and a controlling headquarters. Often these missions required up to 10 hours of flying time a night and pilot fatigue became a problem. It was a difficult task to remain alert during such a mission but the lives of many people depended upon just that.

Night missions flown in support of special combat operations presented a challenge. These operations were wide in scope and varied from long range night patrols and ambushes to small unit search and clear missions. Usually the aircraft was the only link between the ground element and its headquarters. In this respect the mission was similar to a radio relay flight, but this is where the similarity stopped. All requests for artillery support were passed from the ground unit to the pilot of the observation aircraft. The pilot would adjust the supporting fires by relaying corrections given to him from the ground. Continuous coordination between air and ground is a must to successfully complete a fire mission of this nature at night.

The pilot of the O-1 also had the option of calling in helicopter gunships or tactical air strikes in support of the ground troops. Finally, the O-1 pilot would occasionally still be on station at first light to guide in the pickup helicopters to extract the unit.

These are just a few of the night missions which an O-1 pilot can expect to fly during a tour in Vietnam. How well he exercises his visual purple will have a profound effect upon the successful accomplishment of these difficult missions.

***His eyes caught the reflection of the sun from several wires crossing the road about three feet above the ground and apparently terminating in bushes on each side of the road***

**Captain Frank C. Gaetje**

DAWN HAD BROKEN over the central highlands with its postmonsoon season cool air penetrating the quarters of the waking pilots. Only one of the three assigned sector pilots showed any enthusiasm for the approaching day and his vigor was only brought on by the fact that he was two days away from his long awaited R&R.

After a hurried breakfast, the aviators attended the usual morning briefing by the Military Assistance Command, Vietnam (MACV) staff. The S-2 had little to report—two agent reports of little significance and one special intelligence report which had come from higher headquarters but was four days old. There were no special missions, just routine visual reconnaissance (VR) of the province.

The S-3 had little more. The highlight of the day was the passing of an Allied convoy into the province with supplies. Road security had been posted since before dawn. Gunships were at their reaction pad along with a platoon of slicks and a company of reaction troops, and the artillery had registered along the route. Continuous aerial coverage of the convoy was assigned to the O-1 pilots.

The O-1 pilots looked glum at being assigned this mission as it usually meant four hours of circling the convoy, refueling and four hours of circling again with only an occasional radio call to the convoy commander to let him know how far back his trail elements were. To make things worse the Air Force O-1 was down for maintenance without a replacement, leaving no one to share the boring duty.

After the briefing the pilots reported to the flight line and the section leader assigned the missions for the day. He and Pterodactyl 22 would VR the province since his aircraft would be due in for its 100 hour periodic inspection (PE) before the end of the day and 22's plane was close to an intermediate. Pterodactyl 23 would pull the unwelcome duty of convoy escort after reconning the convoy route for possible ambushes.

After pulling his normal preflight 23 was airborne. As the convoy was not expected to arrive at the province border—where his responsibility would begin—for another 45 minutes, he decided to make a detailed, low level recon of the entire route. Flying at contour level and constantly S-turning across the road, 23 reconned the route plus one-half mile on each side of the road. He arrived at the border as the lead elements of the convoy were approaching and advised the convoy commander that the entire route appeared clear.

The convoy was unexpectedly large due to the fact that the previous month's convoy had been canceled by monsoon rains. The 70 plus trucks stretched as far as 23 could see from his lofty perch. It took him almost 20 minutes to make a round trip over the length of the main element. Some 4 miles behind the main element came the trail element consisting of almost 10 vehicles which had broken down and had to be repaired at one point or another during the trip. The trail, 23 surmised, would be a problem and would in all likelihood fall further behind if any other vehicles were forced to fall out because of maintenance.

As the lead elements approached the little village, which was the halfway point through the province, they stopped to allow the remainder of the convoy to close. The trail element already had two more trucks fall out and were even

# ROUTINE MISSION

further behind. After making one last traverse of the convoy, 23 departed to refuel. He noted that the helicopter crews were lounging near their aircraft as he passed overhead and hoped that they would not be needed to defend the lightly armed convoy against an enemy attack. But 23 reassured himself with the knowledge that he had seen nothing suspicious during his earlier recon of the route.

As he landed he received a call from the convoy commander that the elements had closed and would be ready to move as soon as he was airborne again.

Within 10 minutes 23 was rolling on takeoff again. This time he would have no relief if trouble came because the section leader had departed for the company headquarters for his 100 hour PE, and 22's bird would be in the middle of an intermediate inspection for at least two more hours. As added insurance, 23 decided to make a fast low level recon of the road as he proceeded toward the waiting convoy.

As 23 viewed the last half of the road the convoy would follow to its destination, he noticed that it did not present many areas which the VC could use to any great advantage to set up an ambush. There were cleared fields ranging from 50 to 200 meters on the south side of the road. The north side was similar except for a hedgerow some 5 meters in depth paralleling almost the entire length of the route. Also there were several sections of dense woods paralleling the road for 100 meters.

After traversing almost two-thirds of the road, 23 thought he saw something suspicious. A second look did not endorse his thought, but a certain sense told him to circle back and take a closer look. While making a wide circle of the area, 23 noticed that the farming activity in the vicinity seemed to be unusually slow. But this was Saturday afternoon and the Vietnamese went into the market on Saturdays whenever possible.

After completing his circle, 23 went down to contour altitude and proceeded on his flight path when he again thought he spotted something. Then his eyes caught the reflection of the sun from several wires crossing the road about three feet above the ground and apparently terminating in bushes on each side of the road. He climbed to altitude and radioed his report to the MACV S-3.

The S-3 replied that the road security was thin in that area and requested a report on the physical location of the nearest element. After sweeping the road on each side of the obstacle, 23 reported that the nearest road security was some 800 meters away. The security elements had made a sweep of the suspected area earlier, but it had been six hours since any friendlies other than 23 had covered the area.

Since the wires were strung where dense woods flanked the road, and because the security elements were quite far off, 23 requested and received permission from the S-3 to fire artillery into the area.

The first rounds landed south of the road and left of the target in an open field. Before any of the following rounds had a chance to land, the world around 23 suddenly resembled ground zero at a nuclear test site. There was extremely intense ground fire coming at him from all quadrants and he could see the VC jumping from well camouflaged holes in the open field.

Being too low to make a diving evasive maneuver, 23 pushed full throttle and tried to get as much air between himself and the ground in the shortest possible time. Simultaneously he made his situation known to all those listening to the radio at the MACV headquarters. He further requested that

the artillery fire parallel sheaths and traverse up and down the road in the area.

Having gained sufficient altitude to protect him from the small arms fire, 23 gathered his wits and surveyed the situation. He radioed his estimate and requested support from tac air, the gunships and the liftships. He was told that this had already been accomplished and that tac air was expected in the area within five minutes.

Initially, 23 reported that he estimated a company of VC was engaged in this action, but as he circled the road he spotted many more VC trying to move across a field toward the woods north of the road. Suddenly, he started to receive more ground fire and his aircraft shook violently as he heard four distinct "CAROOMS" in quick succession which seemed to come from his left wing.

He once again pushed in full throttle and tried for more altitude and distance, 23 noticed large green tracers following him through the sky. Fortunately, no more rounds found their marks, but he now knew that he had been hit by a 12.6 mm VC machinegun —a weapon usually found in enemy units of battalion strength.

As he cleared the immediate area, 23 surveyed his left wing for damage. He noted that there were four not-so-small holes about three feet in from the left wing tip and neatly spaced from front to rear. He was certain that the rearmost hit had split the left aileron since the outboard two feet did not respond when he moved the control stick. He wondered about structural damage and hoped that there was none because he could not leave the area for repairs.

Within seconds of his reaching altitude, the first flight of fighters called in on station. Wasting no time, 23 put them in on the 12.6 mm emplacement. If the choppers were to come into this area, the big gun had to be silenced. On the first pass the lead fighter was short and left of the target and took two rounds, but his wingman spotted the gun emplacement and wiped it out on his pass. On their succeeding passes, 23 worked the fighters on the north side of the road.

Another flight of fighters arrived and yet another was on the way. He again worked this most recent set of fighters on the north side of the road in an attempt to cut off the withdrawing VC. As he was putting the second flight in, he was also receiving the hastily drawn up operations plan from the MACV S-3. He would use the third flight of fighters on the south side of the road just prior to the arrival of the already airborne troop-carrying slicks. The gunships would support the landing while the artillery would be held in reserve to support the ground troops once they started to maneuver.

The last set of fighters was used according to plan. The gunships dusted the area surrounding the LZ as the first lift was vectored in by 23, and then stood by to cover the remaining lifts. As the last slick touched down and discharged its troops, 23 received a call from 22 that he was on takeoff roll and would be up to relieve as fast as he could get there.

Twenty-three remained on station over the deploying troops for command and control and radio relay until 22 arrived, and then headed for the airfield. Enroute he reflected about the morning's staff briefing and how the pilots had so unenthusiastically received the boring mission of covering the convoy. He then projected his thoughts to tomorrow's briefing when, in all likelihood, he would get the mission of escorting the convoy until it departed the borders of the province.

And that mission would definitely be a lot more boring than today's.

Within minutes 23 was rolling on takeoff again

# HONESTY

Major John F. Coats

## you may think you're good, but don't fool yourself

THAT'S A rather awesome title and it undoubtedly appears out of place in a magazine dedicated to Army aviation and its many aspects, but is it? I think not.

The Army aviator today receives the best training available. The equipment he flies is more sophisticated and better suited to its job than ever before. The maintenance of these aircraft is of high quality and technological advances continue to provide useful tools in quality assurance. The navigation aids we use, the safety devices designed for our protection and the ever increasing use of radar and improved communications equipment all contribute to flying safety.

If you find yourself bouncing around through the clouds like a cork in the North Atlantic, you may ask, What does honesty have to say to me? What does integrity have to do with the "coup'la hundred rpm" you've just bled off? Let's take a look.

Some years ago, United States Steel produced a safety film entitled "Knowing is Not Enough." It portrayed a typical employee in various situations in his home, at his work, at play and on the road. He was protected through the magic of the camera by a red flag which signaled an impending dangerous situation which involved a conscious decision on his part: To succumb to the temptation of disregarding known safety precautions or not?

Unfortunately, as we face the demanding situations we encounter daily we don't have a red flag to signal impending danger. Or do we? The decision actually boils down to a question of honesty.

As we prepare for flight, we are faced with many decisions which we must answer honestly if we would continue to pursue our chosen profession. First, *Is our craft airworthy?* An honest answer can be given only after a thorough preflight that includes an analysis of the log book. The only honest answer must be predicated on a full working knowledge of the aircraft systems and the allowable tolerances, etc. Have you ever flown a bird without knowing how it works? Certainly we all rely on our maintenance personnel and we must. But would you believe flying a Hiller with the whole rotorhead splined to the mast out of alignment? I did, for well over a year. Sometimes the most obvious is easily overlooked. Do you honestly seek the background to preflight and apply it daily?

We must evaluate the existing conditions: the weather, the mission and the tactical situation. Again, prior to making decisions, thorough knowledge is required and this requires a continuing effort. With the requisite background, an honest decision can be made but tempting expediency or other detractions such as *the easy way* require a dedication to an honest application of knowledge.

Finally, and this is probably the most difficult evaluation we must make, we must honestly evaluate our own abilities. Pride and failure to recognize that the "old grey mare, she ain't what she used to be" have been the epitaph for more than one old pilot. Over eagerness and failure to recognize lack of experience has sealed the fate of a number of new pilots. A continuing honest evaluation of one's self is probably the most important factor in success in any area. If we know and accept our weaknesses and concentrate on strengthening these areas, we mature.

Honesty, particularly with one's self, definitely has a place in flying. In fact, it is prime. *Don't ever fool yourself.*

Preflight the armament system? Confound it, boy, that's just school stuff. It's not meant for us real pilots

# Frozzleforth's Unlearned Lesson

**Captain Thomas S. Scrivener**

FIRST SERGEANT Ranken Phyle paused in front of the door marked "CO" and rapped twice. He entered when Major O. D. Stubwing moved some paperwork aside and said, "Come in."

"Sir, two aviators have just signed in," announced 1SG Phyle.

"Outstanding!" beamed MAJ Stubwing with a broad grin. "We've been shorthanded too long. Show them in."

1SG Phyle stopped back into the orderly room and held the swinging gate open for a major and a warrant officer. "MAJ Stubwing will see you now," he said.

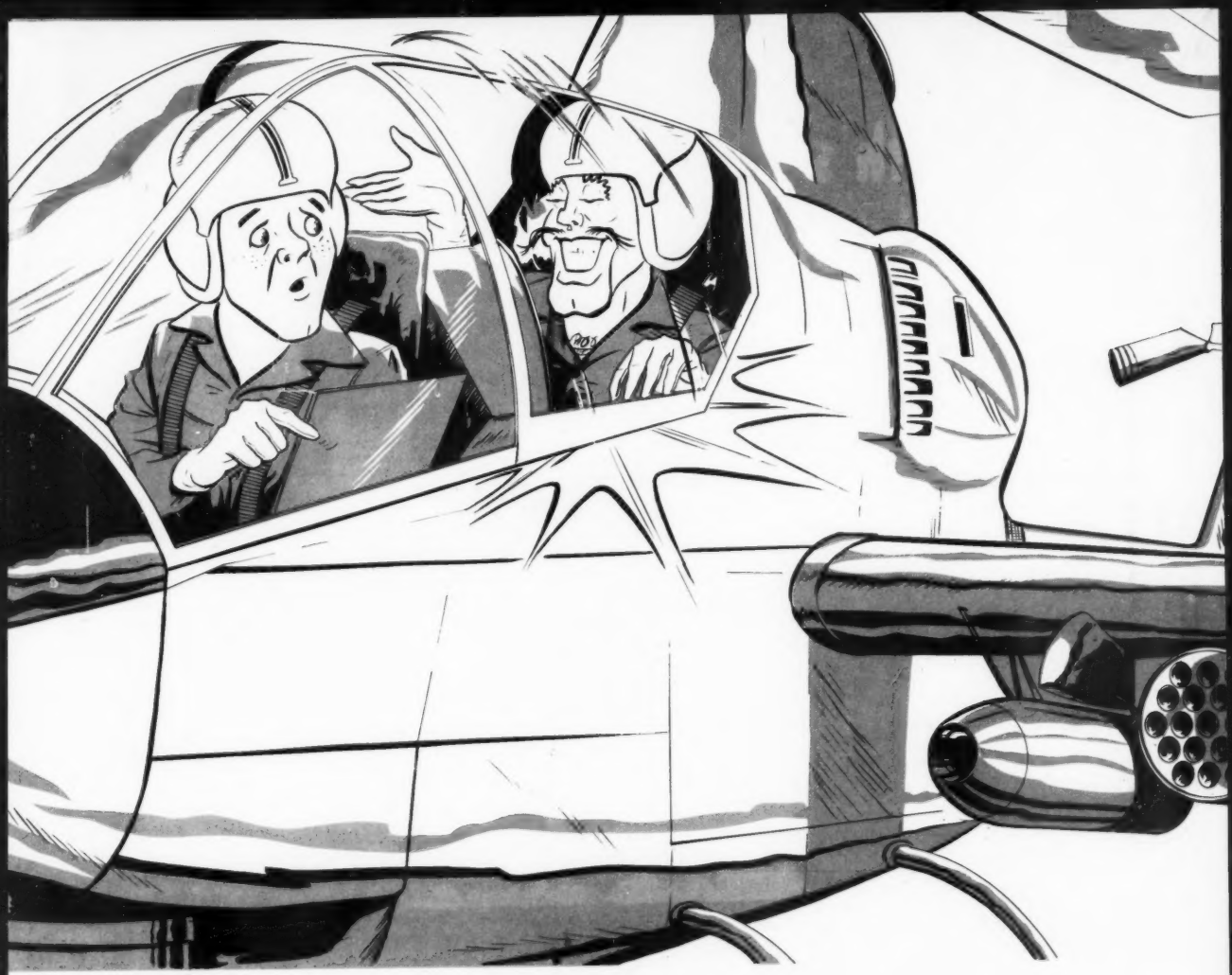
The first of the new aviators strode briskly into MAJ Stubwing's office, misjudged the distance to the CO's desk and ground his right kneecap into its gray metal front.

With a painful grimace which showed a mouth full of brilliant white teeth under a full handlebar mustache, he snapped to attention, the orderly room and held the to be heard 40 miles away, "Major Horatio Z. Frozzleforth and WO1 Pro Ceedure reporting for duty, sir!"

MAJ Stubwing returned the salute and invited his two new aviators to be seated and have a cup of coffee.

He explained that Delta Company, 226th Assault Helicopter

He shook the synch elevators vigorously



**Frozzleforth cut Ceedure short by slamming the canopy shut**

Battalion, had a twofold mission: to provide cover for troop assault lifts performed by other elements of the battalion and to serve as a ready reaction force for a large area in the Republic of Vietnam.

MAJ Stubwing stated that the AH-1G Cobra recently had been introduced into the 226th and he had barely enough officer and enlisted personnel to meet his mission requirements. He also told Frozzleforth that because he was the second ranking man in the unit he would be the executive officer.

Frozzleforth's usual smile immediately decayed into a frown.

"What's wrong, Major? Doesn't being my XO appeal to you?"

"It's not that I wouldn't enjoy being your executive officer, sir," Frozzleforth asserted, "it's just that with my vast experience as a gunship pilot I feel I might be more useful as a platoon leader, not shuffling papers. After all, I fired the first rocket from a helicopter in this country and was instrumental in developing the gunship tactics used here today. Why, I didn't even attend those tactics classes at Hunter, I know so much about it."

MAJ Stubwing pushed back from his desk, licked his lips, started to say something but thought better of it, at least for the moment. Then he remarked, "I wouldn't worry about getting your flight time in a Cobra if I were you. We are shorthanded, as I said."

MAJ Stubwing then asked if either of his new warriors had any questions.

Frozzleforth inquired about when the bar at the officers' club opened. When his question was answered he and WO1 Ceedure saluted and left to move into their new quarters.

At 0615 the next day Ceedure was trying for the third time to shake Frozzleforth from a deep

# Confound it Frozzleforth, open fire!

## I'm taking hits!

sleep. Frozzleforth mumbled something about how good another gin and tonic would taste and gently raised one eyelid to half-mast.

"Whatsa' problem, son?" groaned Frozzleforth.

"Time to preflight, sir."

"Huh? . . . oh yes . . . well, no sweat," mumbled Frozzleforth. "I have already checked into the maintenance situation here and it seems to be up to snuff."

WO1 Ceedure persisted, "But, sir, I thought that with all your flight experience you could show me the best way to conduct a preflight."

Frozzleforth was annoyed at being awakened for such a trivial matter as a preflight, but pleased that this intelligent young man had realized his true ability as an aviator.

On the flight line Frozzleforth pointed out the importance of checking the fuel, oil and hydraulic fluid levels. After Ceedure had done all this, Frozzleforth shook both the synch elevators vigorously and announced it was time for breakfast.

"But what about preflighting the weapons, sir?" asked Ceedure.

Frozzleforth assumed an almost paternal look and put his hand on Ceedure's shoulder. "Pilots just worry about shooting 'em, son. All that armament preflight business is just something to keep you busy in school. Real aviators leave the guns to the armament personnel. Let's go eat, briefing is at 0700."

At the briefing MAJ Stubwing explained that the mission was to recon and prepare a landing zone (LZ) and cover four flights of five slicks which would carry ground troops. Start time for the gunships was 0735.

At 0733 Frozzleforth strode quickly toward his aircraft, his white scarf trailing proudly behind his neck like the banner on a knight's lance.

"Let's build a fire and go!" he called over his shoulder to WO1 Ceedure.

Pro Ceedure only was able to say, "Sir, I think . . . " before Frozzleforth slammed the canopy shut.

Frozzleforth quickly brought the Cobra to operating rpm and barely missed striking the revetment in his haste to join the rest of the flight, which had already formed for takeoff. His position was to be number two in a heavy fire team.

Enroute to the LZ, he listened to the steady whine of the engine and the chop of the rotor blades. Frozzleforth knew the Cobra was his type of aircraft.

WO1 Pro Ceedure also was thinking as he flew. This was his first flight in a tactical situation—at last all that school training would be put to use. Why then, he wondered, did the man in the back seat so completely disregard everything they had been taught at Hunter?

Frozzleforth was anxious to get to work. He called the fireteam leader and suggested that he increase his airspeed to 160 knots. Lead was only mildly perturbed by this suggestion, held his airspeed and arrived on station at exactly the right time.

The team leader became much more disturbed, however, when he received automatic weapons fire on his low recon pass over the LZ.

"Rolling in with suppressive fire," Frozzleforth announced. Now experience will speak for itself, he thought.

Frozzleforth pushed the cyclic firing button. Nothing! Three times he got the same result.

"Come on two, lay down some fire! I'm taking hits!" the leader called.

"Get 'em, Ceedure!" yelled Frozzleforth.

"I don't have any lights on my armament panel," Ceedure replied. "Are you sure the system is armed, sir?"

"Confound! Why didn't you remind me of that sooner?" Frozzleforth was irate. How could Ceedure, who seemed so competent, foul up so badly on his first mission he wondered?

On the second pass lead took a hit in his engine. The only available forced landing site was the proposed LZ. Lead made a perfect autorotation, but then appeared to be surrounded by very unfriendly elements.

Frozzleforth switched to inboard stores and depressed the cyclic firing button. Again nothing happened.

"That's what I wanted to talk to you about when we started," Ceedure said. "Our right XM-18 isn't loaded and the safing sector is off the left one."

"Blast those incompetents in armament," roared Frozzleforth. "They should have checked that!"

"I thought that in the armament classes at Hunter they told us pre-

flight of the armament system was the pilot's responsibility," said Ceedure.

"Yes, but that's just school stuff, not for us REAL pilots. I'll just switch to outboard and . . . what in the . . . where did that red smoke come from?"

"I think that was a flechette round instead of HE," Ceedure answered. Pro turned his head away as he noticed how close to the downed crew the round had come. As he turned his head, Ceedure noticed something wrong on the right wing. The cannon plug was not connected to the rocket pod.

Frozzleforth could see tracers flying past his canopy now, but his main concern was the crew on the ground. Those stupid ammunition people, he thought. When I get back I'm going to let them have it for the way these rocket pods are loaded.

Fortunately, the crewmen of number three ship had preflighted all their weapons systems. They knew they were in working order and thus provided the only usable covering fire in this tight situation.

On his third pass Frozzleforth flew down a tree line, firing the turret in the stowed position.

"There they are in the opposite tree line!" shouted Ceedure. "Let me have the flex turret and I can get them." In the mirror Pro could see Frozzleforth's perplexed look. "Flip the pilot/gunner switch on your turret control panel to the gunner position."

Frozzleforth mumbled something into the intercom about going to ground classes and did as Pro had said.

Two long bursts from the minigun and the enemy weapon was silent.

Frozzleforth was replaced on station by another aircraft, the downed crew was extracted unhurt and the lifts came in without further incident.

That evening Pro Ceedure went to bed with a throbbing headache. Frozzleforth went to the club to down his daily dozen and recount hair raising tales of his past experiences to the newer pilots.

As Frozzleforth sat at the bar Lieutenant Colonel Straighten Level, the brigade S-1, walked in. "We have a levy to provide a major as R&R officer in Bangkok. Frozzleforth, are you interested?"

Frozzleforth twirled the tips of his mustache and smiled as he said, "Sir, I really feel that I can do more good for the service by sharing my knowledge of aviation with the new guys . . ., however, I've always thought that aviators would make the best R&R officers. As a matter of fact, as I was telling the 707 pilot coming over here, the most. . . ."

**The switch, Major, flip the switch!**

# Instrument Flying In Vietnam

CW2 Richard C. Beaver

**Since essential missions must often be accomplished in marginal weather, pilots in Vietnam must be prepared to proceed IFR on any given mission**

FOUL WEATHER FLYING in the Republic of Vietnam can be very different from IFR flying in other parts of the world. The difference does not lie so much in the weather itself but in many other aspects, such as how and when the weather is encountered, the capabilities of aircraft and pilot and the facilities and controlling of aircraft. Therefore, this article discusses these other aspects as they apply primarily to I and II Corps areas where some are more significant than in other parts of Vietnam.

Under the category of pilot capabilities, one of the most significant aspects is experience. Most of the helicopter pilots in Vietnam are fresh out of flight school. They have had 50 hours of hooded flight and very little or no cloud time at all. This is a handicap because there is a definite difference between hood and actual instrument flight. One of the least commonly known differences is that under the hood the pilot's vision is restricted but wherever he looks he has good depth perception, while in a cloud without a hood he can't help seeing the cloud pressing on all windows.

As a person glances through a window his eyes automatically try to focus for depth, but this is difficult if not impossible. This temporary loss of depth perception creates odd sensations, depending on the pilot and how long his depth perception is lost. The effect can be negligible or it can make the pilot think he has vertigo or even cause vertigo itself. This problem is greatly reduced with experience of which the new aviator has little or none.

There is another aspect of this problem which is unique to the new aviator with only his flight school instrument experience. During the training phase, the instructor pilot and student devote a lot of attention to imagining and simulating all the physical characteristics of instrument flight conditions. For several reasons little attention is given to simulating the frame of mind the student would be in during his first few encounters with weather.

All of these problems are a result of lack of experience. The best way to alleviate the problem is to give the new aviator experi-

ence. The company IP or aircraft commanders with ample experience can arrange to fly with new aviators on a day that will permit a reasonable amount of actual instrument time, and if they can't get a courier mission or any other mission during which it would be practical to fly IFR, they can file home after the regular missions are over. With a few hours of actual instrument flying and an ample amount of hood practice the result is a more capable and confident aviator. The extra time on the aircraft is well worth the investment and clouds won't be hard to find in Vietnam.

Closely related to the pilot's capabilities are those of the aircraft. On many occasions in Vietnam, pilots will take off on a VFR mission in marginal or deteriorating weather in aircraft with several inoperative components essential or desirable for IFR flight. At some time during the mission the pilot might be forced to proceed IFR in an aircraft not fully equipped for IFR.

Instrument replacement shortages are not an unusual problem. During prolonged periods of bad weather, like monsoons, the maintenance officer can help by taking this into consideration when he figures his aircraft availability. As far as getting the needed parts faster, the battalion maintenance officer and battalion safety officer make a good team by putting pressure on higher echelons through two different channels to look into the problem.

Fuel is a different problem. Sometime weight is more critical than endurance. Be familiar with all instrument facilities and alternate landing areas and on marginal weather days make accurate fuel checks and don't over-extend yourself. This may mean a few extra trips to POL, but if it saves your life just once, it's worth it.

Another weather related adversary is fear of clouds. This does not apply just to the aviator's fear but also the attitude of his fellow aviators and, more important, something like a clouds-are-taboo policy set by the unit commander. Here I am talking about unit commanders who overemphasize staying away from clouds. This affects the aviator's judgment and thinking in two ways. First, he feels he won't be flying in clouds so why waste time staying proficient. Second, there are many times when it is much safer to file IFR than to try to sneak home under the clouds, especially in the mountainous terrain in the northern half of Vietnam.

Closely related to this is bad advice which is free and plentiful in any business. During my first tour in Vietnam, the worst advice I ever received was from an aircraft commander with over six months incountry. He always told new aviators, "If you ever inadvertently go IFR, roll into a 180 right away." I tried it and it was disastrous. When you are just transitioning onto the gauges is no time to be doing abrupt maneuvers. Fly straight until you have definite control on the gauges, then worry about getting out.

As far as policies applicable to IFR flying, each unit SOP (Standing Operating Procedures) is the best guide for its particular area and mission requirement. In general, remember there are times when it is better to file IFR before it becomes necessary rather than after: if it is done before, it is prior planning; if it is done after, it is emergency procedure.

Now I'd like to discuss some of the facilities available and how to get maximum use out of them. One of the best but least used is metro (pilot to forecaster weather service). The advantage of metro is that it can give up-to-the minute accurate observations in detail for specific locations. This is possible only when all the pilots cooperate. No one can argue the fact that a forecast is only a prediction while a PIREP tells it like it is. The theory of use and misuse applies 100 percent in metro. When the pilots in an area don't give PIREPS and don't utilize metro, it becomes lax, its operators feel unimportant and don't put forth any extra effort. When pilots put a load on metro and give PIREPS, the operators become aware that pilots are interested in their work and depend on them. This results in a greater effort on metro's part and its personnel go out of their way to give very comprehensive coverage of their area of responsibility.

During periods of bad weather, the ground commanders depend on aviators for weather information pertinent to the landing zone. Anyone can make the go or no-go decision when the flight is nearing the vicinity of the landing zone but this is bordering on hindsight. It is a feather in the flight leader's cap if he has this information before the mission begins. This feather will best come from working close under the protective wing of metro.

Now, let's discuss some facilities for navigation and approach. The ADF is one of the primary means of navigation for Army helicopters but is not used as often as it could be. In some areas of Vietnam, ADF beacons are few and far between. In some parts of the I Corps and II Corps areas, they seem even more scarce at lower altitudes due to mountainous terrain. In my experience in these two areas, we could seldom fix an intersection of two beacons to determine our position. The reason was we couldn't receive any two beacons from one location. The most practical solution to this problem is time and distance. The ADF will keep you on course and time and ground speed will give you your distance. This usually raises the question, "How do you figure ground speed without ac-

Night missions, especially during marginal weather, can be made easier and safer by utilizing all instrument facilities, including radar which covers nearly all of Vietnam and offers excellent cross-country navigation assistance

curate knowledge of the winds aloft?"

One suggested method is to ask radar for your position occasionally, then check your time between reported positions and compute your ground speed. True, this method is not the most accurate but it should keep you in the ball park.

The ADF approach is not used as much as it could be due to a lack of approach plates. These can be obtained for most major airfields if they are requested. Some locations don't have a published approach. A unit working out of a location without a published approach would do well to make one and flight test it. If you get caught in a pinch with GCA down and not enough fuel to make an alternate, a homemade ADF approach can save your life.

The other primary mode of navigation is radar, by far the best approach facility. A PAR (precision approach radar ) is accurate and brings you safely down to the lowest possible minimums. It is possible to go just about anywhere in Vietnam on radar which has many other applications aside from cross-country navigation and approaches. Night missions, especially during marginal weather, can be made easier and safer. For example, flare missions are sometimes critical in reference to where the flares are to be dropped so as not to illuminate friends when they don't desire to be seen. After a quick briefing with the controller of the area which is to be illuminated, he can vector you to prearranged points to drop flares. It is possible to do flare missions completely IFR or VFR-on-top.

At this point I would like to mention briefly a simple runway aid for easier GCA or ADF approaches at night or in marginal weather. Some runways are poorly lit and hard to see in the very few seconds you might have to decide whether to land or go around. The solution is high intensity approach lights. To make these lights, secure two barrels or large diameter tubes and prop them up on the approach end of the runway so they point up the glide path. Also leave some trip flares with the nearest operations bunker or the control tower. The next time you have to make an approach to near minimums, call ahead and have the flares dropped into the tubes when you are on final. You will have two high intensity approach lights that are difficult to see from the ground but which unmistakably mark the runway for anyone coming in on an approach.

In summary, I'd like to make a few general comments. Proficiency and prior planning will often obviate the necessity for using emergency procedures. It is usually better to file IFR before departing than to have to file in the air. If you must file in the air (and don't hesitate to do so), it's better to file before you go into the soup rather than after.

IFR flying is precision flying based on common sense and good judgment. It requires knowledgeable pilots and well-maintained equipment.

# A PLACE TO GO

## . . . and we don't mean Hades

**CWO James T. Petraitis**

ALL OF US "fling wing" jockeys have undergone ample and excellent training in the fine art of autorotations, usually in the friendly skies of CONUS. We've also had pounded into our thick skulls the idea of keeping adequate forced landing areas within reach, when possible. But how many of us are guilty of violating this basic rule when it was possible to alter our flight path or altitude to take advantage of favorable terrain?

Sure, Army aviation performs many missions where this is impossible, but there are times when an extra bit of altitude or a zigzag flight path would not affect the mission and would provide a place to go in an emergency.

I had this point brought vividly home recently and thanks to an extra bit of sky under me, the story ends on a relatively happy note.

I had the day off but was assigned to replace a fellow aviator who had to attend to some pressing matters. I was to fly an OH-6A command and control (C&C) aircraft for an Infantry battalion.

My first mission was to take the acting battalion commander and an artillery liaison officer on a high reconnaissance of an area in the mountainous region west of Camp Evans in I Corps, Republic of Vietnam. Heading west from the battalion base camp, the mountainous area begins with a ridge line running northwest to southeast, approximately 1,500 feet above the lowlands which stretch eastward toward the South China Sea. West of this first ridge line is thick, triple canopy jungle and mountain peaks over 5,000 feet high including the infamous A Shau Valley region.

The ground commander had given no specific altitude requirements enroute, so I flew at 3,000 feet since the weather was good and this altitude offered forced landing areas enroute. After crossing the ridge line, I took up a northwesterly heading and flew a course generally paralleling the ridge and to the west of it.

Ordinarily we flew at about 2,500 feet in the area, but for some unexplained reason I flew 500 feet higher than usual on this mission. This undoubtedly saved three of Uncle Sam's troops from a possible tree landing when the old reliable turbine engine conked out.

We were just approaching the area we were to recon, preparing to descend to a more suitable altitude for observation, when I observed a momentary rise in rpm. Then the engine failed with a loud bang. I immediately entered autorotation and headed for the lowlands—the only suitable terrain around for landing. The 1,500-foot ridge line separated us from the low lying areas beyond and we cleared the peaks by less than 200 feet. The pucker factor was at max by then.

Since my transmitter selector switch was on FM, I made a quick call to operations and asked the nonrated major in the front seat to turn the UHF radio to the guard position. He responded with a blank stare as he had no idea what a UHF radio looked like. His communications experience was all FM. This necessitated the not too pleasant experience of securing the collective pitch with my knee during autorotation and changing the radios myself. Had I given my passengers a proper briefing before taking off, I could have avoided this situation.

After transmitting a few appropriate Maydays on guard, contact was made with some Air Force FAC people, some good old 1st Cav gun pilots, and a slick driver. I had what looked like a suitable area in sight so I transmitted the location of my intended touchdown point and returned to the job of trying to land a ton of helicopter without power. I wasted my breath telling my passengers to secure their seat belts—they had all strapped in tight at the first indication of trouble.

Initial touchdown was a bit hard on a dike hidden by three feet of vegetation. Also, my forward airspeed was a bit in excess of what we'd been taught for autorotations. The impact pitched the aircraft up and forward in a nose low attitude but the voices of every instructor pilot I'd ever had were screaming at me above the noise of the engine out audio telling me to level the aircraft.

As the aircraft came to rest in a level attitude, I managed to grab my survival gear (a weapon and clip of ammunition) but my exit was stopped by a bone-shaking thud. It seems that in my haste I had forgotten to release my seat belt and shoulder harness. There

**If the engine quits you've got problems, and you may find yourself wishing you'd cranked in an extra bit of altitude, or altered your flight path a little so that you could make it to the nearest open area**

are still two faint vertical welts on my chest reminding me to look before I leap.

As we were completing a makeshift defensive perimeter, we learned of the tremendous reaction time of the Cav when it comes to rescuing downed airmen. We were on the ground for only about three minutes when a big, beautiful slick dropped in to pull us out of our knee-deep mudhole. Flying back to base camp our hearts were warmed by the swarms of Cobras, scout aircraft, Bird Dogs and assorted Hueys that responded to our call.

Within an hour our downed aircraft was secured by an aerorifle platoon, maintenance personnel had rigged it for evacuation, and the ship was found to have suffered no damage from its autorotational landing. With a storybook rescue like that, it would seem that this little episode should have a happy ending. But read on.

A young officer, a recent graduate of flight school with no in-country external load experience, decided he could recover the OH-6 just as well as the unit maintenance officer who had handled many similar recoveries. He turned down offers of help from some experienced slick drivers and attempted to recover the ship with a C&C Huey which had about 400 pounds of radio equipment installed.

The OH-6 was dragged along the ground during liftoff, resulting in major damage to an aircraft which otherwise would have been flyable after a relatively simple engine change.

A few things I learned from an otherwise commonplace war story include:

- Turbine engines, reliable as they are, do fail.
- Your first trip to complacency may be your last.
- Brief all passengers before, not during, a crisis.
- Brief passengers on use of seat belts, available radios—especially the guard selector switch—emergency exit procedures, etc.
- If at all possible, vary mission altitude and course to take advantage of both friendly terrain and forced landing areas.

# Rapid Refueling

By utilizing equipment that is readily available, helicopter company commanders are finding that rapid refueling of from one to 20 aircraft is no problem. This capability means greater efficiency and more flexibility under combat conditions

**Colonel F. E. Johnson**

Below. Refueler removes fuel tank cap and prepares to insert nozzle while fire guard watches. Above right: A line of UH-1 Huey helicopters refuels simultaneously. Below right: Equipped with gloves, goggles and extinguisher, a refueler opens the gate valve to let fuel into the 1½-inch discharge hose leading to the refueling nozzle

THE IMPORTANCE of rapid refueling of aircraft to the Army is reflected in a story that made the rounds back when the United States set the first round-the-world jet age record. The pilot blasted off from the East Coast. Zoom—up to Mach 1. Soon there's England. Flaps and wheels down, screaming brakes burn rubber. Up comes the little yellow refueler. Whoosh—zoom—up and away. There's Turkey. Down again. Up comes the little yellow refueler. Again, Mach 1 speed, landing, little yellow refueler and up and away—repeated over again and again. India, the Philippines, Guam, Hawaii, the West Coast and then down on the East Coast with the circle complete. As the pilot stepped out to the cheers and the screams of "Wow, what speed!" "A flash of lightning!" the pilot was heard to whisper, "That damn little yellow truck sure made good time, too!"

That's the whole point of this article. Fuel, jet juice, POL, gas, JP-4, turbo fuel or what-have-you —it's still the little guy with the

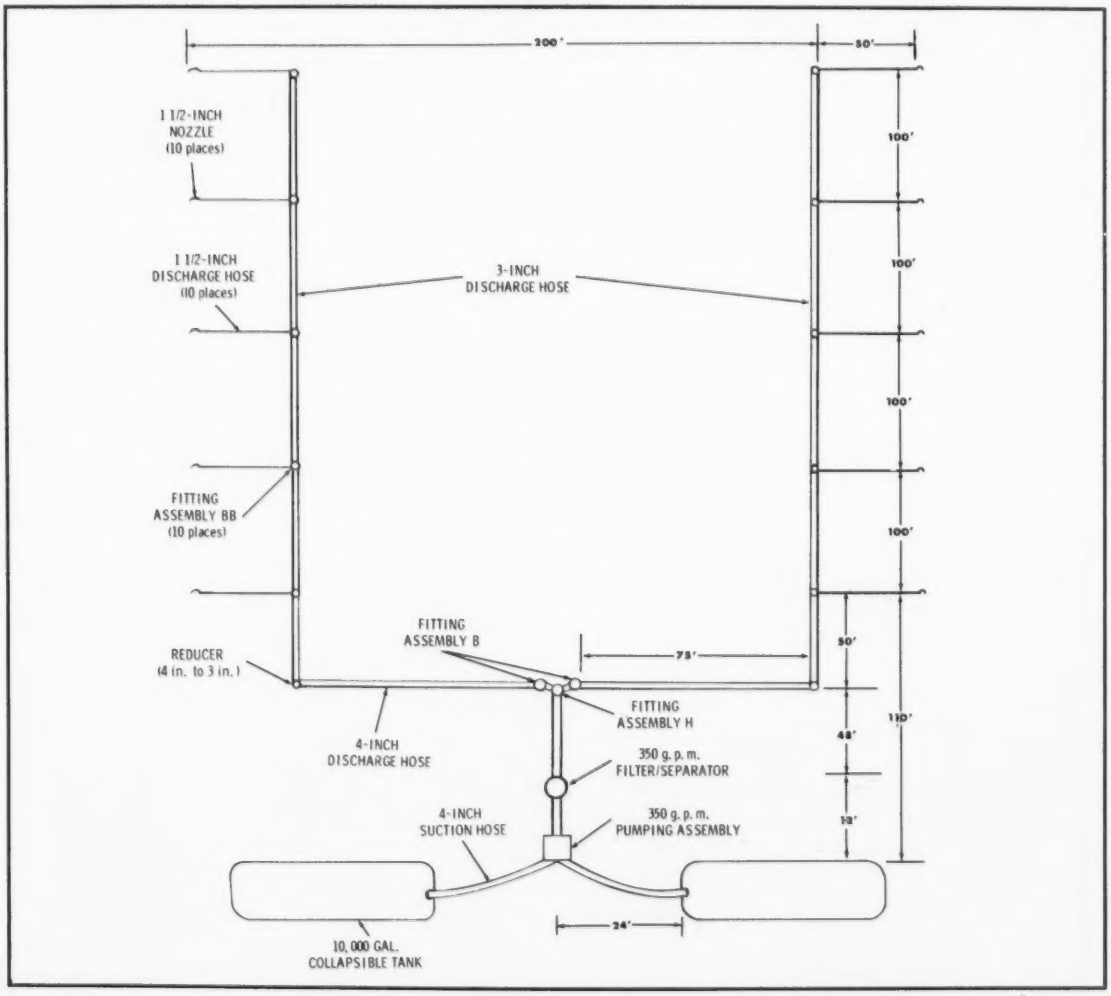
big nozzle that gets you up and away.

The chopper is a "natural" in today's combat environment. The get up and go; the low nap-of-the-earth traverse; the quick, darting slant down; the release of ordnance, men, supplies; a Dustoff pickup—all is as natural as can be for the helicopter. But refueling is essential to all of this. Pilots cannot afford the luxury of queuing up or a 5- to 10-minute shutdown. Consequently, rapid refueling or "socking the fuel to 'em" while blades are rotating is a must. Commanders recognize it, pilots know it, CONARC sanctions it and the U. S. Army Quartermaster School's Petroleum Department at Ft. Lee, Va., teaches it.

Choppers are known jet hogs. They gulp fuel in great quantities. Since they are worth nothing while shut down, the payoff is in the air. If the distance and load are such that a full tank won't make a round trip, the answer is refuel at or as close to the objective area as possible. As in the Republic of Vietnam, an intermediate setdown may be called for to pick up troops and shoot for a hot landing zone; then a rapid discharge of personnel, back to the intermediate point, a fast refuel and slant back in to pick up and evacuate the troops. The same is true with Dustoff. Medevac choppers are most effective

Right: A 5,000-gallon trailer, providing both fuel and pump, is used as an alternate fuel source. Below: The layout for the 10 Point Rapid Refueling System

FIGURE 1



FLAMMABLE
NO SMOKING WITHIN 50 FT

# Rapid Refueling

when shuttling back and forth and not spending time on the ground refueling or awaiting refueling. This also holds true with the big CH-47 Chinook and CH-54 Crane. Payloads enroute and delivered are the payoff, not long distances heavy with fuel and light on load or downtime on the ground waiting in line for fuel.

The current POL equipment inventory holds a large bag of tricks. It includes pumps and filter separators with capacities of from 50 to 350 gallons per minute, collapsible bags from 500 to 50,000 gallons, quick-coupled hoselines, fittings and nozzles which are air transportable and battle tested. Using a building block or modular concept, simultaneous refueling of from one to 20 aircraft is no problem. The flexibility is such that any number of aircraft can be refueled by assembling the equipment needed to do it. Additionally, fuel resupply points can be set up the day before, revetted or sandbagged. Then by mass refueling while blades are turning, fill 'em up and get 'em off before Charlie zeroes in.

Still, there are big problems—dust for one (or snow). In addition to the pilot not being able to ground orient, the junk whirling about gets into the engine, the fuel, and the equipment compounding the difficulty. Pallatives are the answer—dust preventatives: plastics, penaprime, black oil, used oils and even water. In the case of snow, pack it down.

Fuel is the next big problem. Large quantities being used means an over-the-ground supply chain in most cases. Granted, some fuel supplies can be airlifted in, but the real answer is always good planning for good resupply. Fuel will always be available if requirements are known, areas are selected and the logistical tail is geared up to do the job. Then and only then is the pilot assured of the margin of safety his mission demands and the principle of hot refueling can be invoked.

The easiest and simplest rapid refueling setup is with component parts of a supply point fuel system, FSN 4930-542-2518. This system consists of two each 350 gallon-per-minute (gpm) pumps, two each 350 gpm filter separators, six each 10,000-gallon collapsible bags and the necessary hoses, fittings and nozzles. A 10-point hot refueling activity can be established with one pump, one filter separator, hoses and nozzles all tied into a 10,000-gallon (collapsible) tank or other source. (Refer to Figure 1 for a suggested layout diagram, Table 1 for an exact identification of items.)

From this lash-up, 10 choppers can be refueled simultaneously at the rate of 35 gpm each. For large sized birds, five points can be established at 70 gpm. (A suggested checklist for a rapid refueling operation is shown in Figure 2.)

In the inventory also is the 500-gallon bag, otherwise known as the doughnut, blivet, sealbin container, pod or what-have-you. It can be tied into the tank and pump unit pump (50 gpm), FSN 4930-542-2800, or to the new 100 gpm forward area refueling equipment (FARE) system presently undergoing evaluation in Vietnam.

Rapid refueling points can be established when, where and as required.

Currently at Ft. Lee, Petroleum Department students are learning

**TABLE 1**

**EQUIPMENT LIST, 10 POINT RAPID REFUELING SYSTEM***

| ITEM | FSN | NO. REQ'D |
|---|---|---|
| Tank, fabric, collapsible, nylon, petroleum products, 10,000 gal. cap. | 5430-292-7212 | 2 |
| Pumping, assembly, flammable liquid, gasoline engine driven, trailer mounted, 4 in., 350 gpm, 275 ft. head | 4320-691-1071 | 1 |
| Filter separator, liquid fuel, 300/350 gpm, 150 psi 4 in. inlet, 4 in. outlet | 4330-017-8798 | 1 |
| Fitting assembly H (flanged type) c/o two 4 in. coupling halves, male, one coupling half, female and one 4 in. Y fitting w/dust caps and plugs | 4730-075-2407 | 1 |
| Fitting assembly B (flanged type) c/o one 4 in. gate valve, one 4 in. coupling half male, and one 4 in. coupling half female | 4730-075-2404 | 2 |
| Reducer, 4 in. coupling half female to 3 in. coupling half male | 4730-075-2423 | 2 |
| Fitting assembly BB, c/o one 3 in. coupling half, female, one 3 in. coupling half, male, one 1½ in. coupling half, male, one 3 in. gate valve and one 3 in. tee w/dust caps and plugs | 4730-075-2409 | 10 |
| Nozzle, 1 in. with female quick-coupling half and dust cap | 4930-360-0611 | 10 |
| Hose assembly, suction, 4 in. I.D., 12 ft. long | 4720-083-0044 | 9 |
| Hose assembly, discharge, 4 in. I.D., 50 ft. long | 4720-083-0046 | 2 |
| Hose assembly, discharge, 4 in. I.D., 25 ft. long | 4720-083-0047 | 2 |
| Hose assembly, suction, 3 in. I.D., 12 ft. long | 4720-083-0045 | 16 |
| Hose assembly, discharge, 3 in. I.D., 50 ft. long | 4720-083-0048 | 14 |
| Hose assembly, discharge, 1½ in. I.D., 25 ft. long | 4720-079-4771 | 20 |

*In addition to the items shown above, supplementary grounding cables and rods, fire extinguishers for each point and the pump, protective goggles and gloves, explosion-proof flashlights and two airfield emergency runway light sets are required. For further details, pertaining to these components of the Fuel System Supply Point, refer to TM 10-4930-203-13.

to set up and operate the 10-point system in a 4 hour block of instruction (1 hour in the classroom and 3 in the field). It has been incorporated into both officer and enlisted courses. Begun during fiscal year 1969, already some 2,400 Army, Navy and Marine Corps personnel, and personnel of foreign nations, have received this training.

The 10-point system can be put together by 10 men in 1½ hours. The entire system can be hand loaded onto one stake-and-platform truck or two 2½-ton trucks.

Instructors use a branch-off, split-stream technique to accomplish two objectives that make rapid refueling workable: reduced pressure and increased flow. A rapid rate of refueling is made possible through increased flow. Reduced pressure makes fuel hose nozzles much more manageable and thereby decreases the risk of fuel being sprayed against a hot manifold with disastrous results.

The safety factor cannot be over emphasized. Thousands of choppers have been refueled hot in Vietnam. Splash, overflow and spillage have to be carefully watched. Until such time as the single point system (closed) or pressure filling with a lock-on nozzle is a reality, it is the man on the nozzle that is important. Students at Ft. Lee are urged to remember this rule: A fool fooling with fuel finally finds fire finishes him and his aircraft.

**FIGURE 2**

**SUGGESTED CHECKLIST FOR RAPID REFUELING**

1. General: Rapid helicopter refueling systems require positive control of aircraft movement, standardized refueling techniques and close coordination between refueling point personnel and aircraft crews.

a. Movement of aircraft at refueling point will be under command and control of flight platoon leader, or section leader.

b. All movement of platoon aircraft at the refueling point will be in trail formation.

c. Each site at the refueling point will be marked to delineate aircraft location. (A brightly-painted section of PSP is recommended.)

d. No smoking or open flame will be permitted in or near the refueling point at any time.

e. No passenger will be aboard an aircraft during refueling.

f. All aircraft will be properly bonded prior to opening the filler caps. The nozzle bonding wire will be connected to the bonding/grounding receptacle or bare aircraft frame by plug or clamp connector as appropriate.

g. All personnel engaged in refueling operation, aircrews and ground personnel will have clothes completely buttoned up. Crewmembers' helmet visors will be down. Refueling personnel will wear goggles and gloves.

h. A fire extinguisher will be placed at each refueling site. A fire truck or other reinforcing firefighting system will be located at the refueling area.

i. Pilot and copilot doors will be open and armor side panels will be in rear-most position.

j. During refueling, intercom communications will be maintained between the dismounted crewmember and pilot by use of an extension cord.

k. Fuel nozzles will be inserted as far as possible into fuel cell before starting fuel flow, maintaining metal to metal contact. The fuel nozzle will be removed only after refueler has received signal from pilot that sufficient fuel has been loaded or at first sighting of fuel approaching fill port.

2. Duties:

a. Refueling officer:

(1) Coordinate with airmobile flight commander on exact location of refueling point.

(2) Insure refueling system is set up properly and purged (Ch 6, TM 10-1101); insure personnel are properly briefed on duties.

(3) Monitor operation and advise airmobile flight commander on operations of the refueling points.

b. Airmobile flight commander:

(1) Determine general location and requirements for refueling points.

(2) Coordinate with refueling officer on exact location of refueling points.

(3) Monitor operations of and safety aspects at the refueling points.

c. Flight platoon leaders:

(1) Place aircraft in trail formation prior to entering refueling area.

(2) Take up position as lead aircraft with number six aircraft designated lead of second section (when using 10-point system).

(3) Insure all members of the platoon understand these refueling procedures.

(4) Control entry and departure of the platoon from the refueling point.

d. Aircraft commander and pilot:

(1) Prior to reaching the refueling point, brief all crewmembers concerning fire procedures. In case of fire involving their own aircraft, the crew will immediately evacuate the area while holding their breath until safely away. The pilot will shut down the aircraft by closing the throttle only.

(2) Move the refueling point upon order of platoon leader or section leader.

(3) Unlatch copilot and pilot doors and move armor side plates to most rearward position prior to refueling.

(4) maintain 6600 rpm (Bell products, turbine engines) place collective pitch full down prior to refueling.

(5) Dismount one specified crewmember.

(6) Signal the dismounted crewmember to begin refueling and to stop refueling. (Fuel load will be determined prior to operation.)

(7) Prepare ship for flight
(a) Doors secured
(b) Armor side plates as desired
(c) Remount crew

(8) Report completion of refueling to platoon or section leader.

(9) Move from site on command.

e. Dismounted crewmember:

(1) After arrival at refueling point, dismount and assist refueler in emplacement of bonding wire before refueling.

(2) Observe refueling and assist in firefighting if required. Fire extinguisher to be held in a ready position during all refueling.

(3) Maintain intercom communications with pilot during refueling.

(4) Cause refueling to stop on pilot's signal.

(5) Insure that fuel tank cap is properly replaced.

(6) Insure bonding wires are removed after fuel tank cap has been replaced.

(7) Verify that pilot and copilot doors are secured prior to remounting.

Dear Danny: I've just finished reading paragraphs 4-191 through 4-197 of the CH-47A dash 10 which states that the primary method for jettisoning external loads in an emergency is to release the cargo hook emergency switch. It has been the practice in our unit to first arm the cargo hook master switch and then release the load with the cargo hook release button. In that way we don't dump the air in the hook and can continue to operate. Most of the guys here agree that they would use the emergency release only after trying the regular system. Many of us have been floundering around in this six-bladed monster for years and feel that we have learned a trick or two. Are we wrong?

CW3 L.S.M., 1st Avn Bde

**Danny's answer: You couldn't be more right, chief. If you get a chance to look at the CH-47B and C dash 10, you will notice that the primary method listed under paragraph 4-186 is to first attempt a normal release. The inconsistency was noted at the last CH-47 operators manual conference and has been picked up as a CH-47A manual revision item. While on the subject, if you will look under paragraph 4-195 (CH-47A) or paragraph 4-189 (CH-47B and C) you will see that there is a caution note concerning closing the hook after a manual release. It states this is to be "accomplished by maintenance personnel." Both the flight engineer and crewchief qualify and it is not necessary to fly all the way back to the maintenance shop.**

★ ★ ★

Dear Charlie: Emergency procedures in the UH-1B checklist tell me what to do when I hear the chatter of a compressor stall but I'm not told to write it up in DA Form 2408-13. Should I write it up? The maintenance officer says "yes."

CPT J.J.R., USAAVNS

**Charlie's answer: Thanks for the tip. Instructions for the write-up of a compressor stall will appear in the next change to the UH-1B operators manual. The maintenance manual (dash 20) outlines the inspection requirements for all UH-1 engines in the event operating limits have been exceeded during a compressor stall. It is important that maintenance personnel know the duration of compressor stall, gas producer reading, engine rpm, torque and EGT at which the stall occurred. Enter this information in the dash 13.**

# Charlie and

Dear Danny: We've got a serious problem with our Huey "H's." We've had a number of near accidents due to loss of directional control during takeoff. It all can't be pilot error. Some of us looked in the dash 10 and found that these machines should perform at the altitude and temperature conditions under which we are operating (field elevation 2,500 feet and about 95 degrees F). Got any advice?

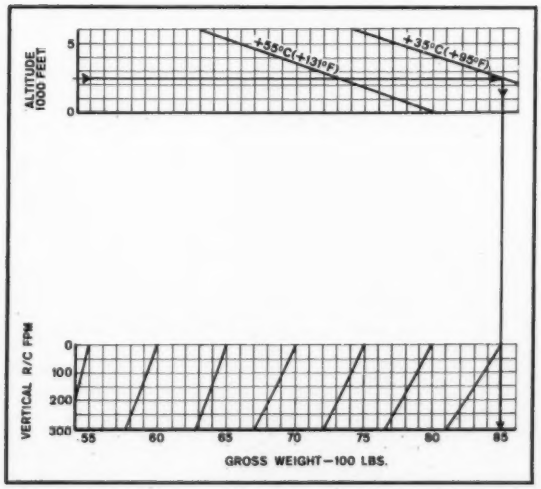
MAJ C.A.S., 1st Avn Bde

**Danny's answer: No advice . . . just facts. By applying the altitude (2,500 feet) and temperature (95 degrees F) to the TAKEOFF GROSS WEIGHT LIMITATIONS chart (page 14-59 of the dash 10) we read a maximum gross weight of 8,500 pounds (see Performance Data Chart below). It would appear that as long as you remain at or below that weight a successful takeoff could be accomplished. However, limitations of the tail rotor *are not* accounted for in performance data charts. Flip to page 7-10 of the operators manual and read paragraph 7-46: OPERATIONAL WARNINGS AND CAUTIONS. It states:**

# Danny's Write-in

**There is insufficient left pedal to maintain directional control when hovering, making takeoffs or landings in adverse winds at**

CHART




**weights above 8,300 pounds at 5,000 feet, and lower weights at higher altitudes.**

**A field elevation of 2,500 feet and temperature of 95 degrees F gives a density altitude of approximately 5,200 feet which is above the maximum safe altitude for the gross weight computed in chapter 14. An effort is being made to include all performance restrictions on charts in chapter 14.**

★ ★ ★

Dear Danny: A group of us have been discussing the pros and cons of dash 10 manuals since seeing your articles in the DIGEST. One question that is not yet answered is why navigation procedures do not appear in chapter 5 with the description of VOR, ILS and ADF radio equipment. If it's not there how do we review our instrument flight procedures?

CW2 A.J.S., Hunter AAF

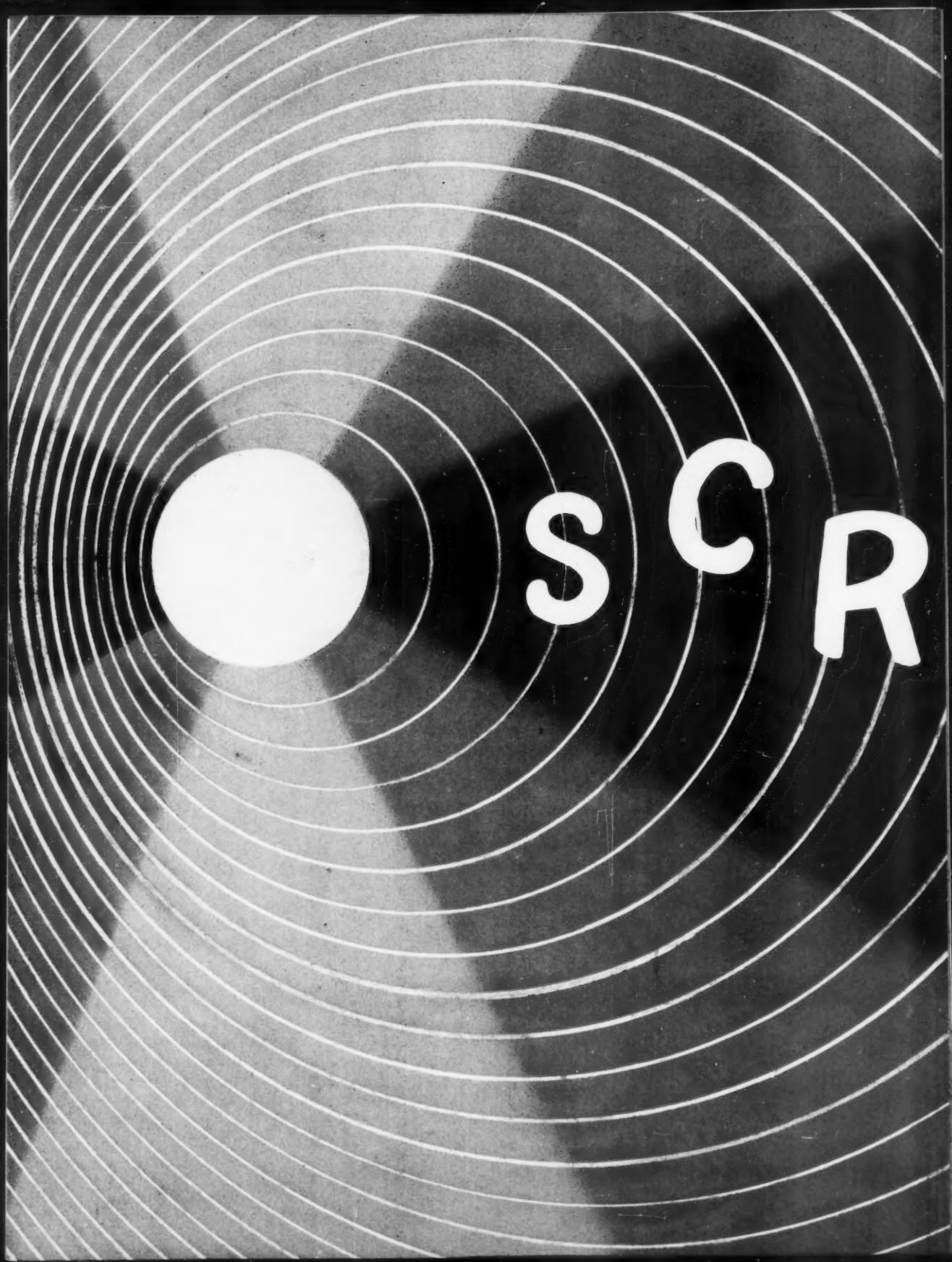
**Danny's answer: When a specific airspeed or maneuver is required for a particular aircraft during instrument flight it will be covered in chapter 10, Weather Operation. A navigation procedure that is common to all aircraft will appear in the Army publication devoted especially to that subject, TM 1-225 (Navigation U. S. Army). TM 1-215, Attitude Instrument Flying, covers both fixed and rotary wing instrument flight techniques.**

★ ★ ★

Dear Danny: Here's a quote from the OH-6 dash 10 (chapter 4, section III, change 8 referring to a tail rotor malfunction): "in power off flight (autorotation)—Upon pitch application at touchdown, the fuselage will tend to turn in the direction opposite the rotation of the main rotor (nose of helicopter swings right opposite torque effect) due to an increase of friction in the transmission system." It has been my experience that just the opposite occurs. The nose swings *left* with torque effect. How about a change to the operators manual?

CW2 L.H.R., 1st Avn Bde

**Danny's answer: Now here's an aviator who's been doing some homework. Section III of TM 55-1510-214-10 dated July 1969 has been revised and gives the correct description of tail rotor malfunction. It replaces the manual and change you referenced in your letter. Comments like yours help us "debug" manuals and checklists.**


SCR

# AMBLE

Captain Sidney D. Rosenthal

TO A HELICOPTER gun jock the word "scramble" has only one meaning—someone's in trouble, get there in a hurry.

The siren blows; the lazy day reverie is shattered; the standby team becomes a mission team facing a critical situation with little opportunity for planning. But a good SOP in the hands of trained personnel can turn possible failure into sterling success. This article will prove the value of such an SOP by reviewing procedural steps employed by crewmembers of a helicopter fire team upon receipt of this type scramble mission.

A scramble mission, as discussed here, is a fire mission about which the supporting helicopter crews have no prior knowledge. The first indication of a mission, and the cue for implementation of the established

procedures, is the sounding of the alarm—in our case a siren. At least three factors must be present and these factors will be presented as assumptions, or constants, in any scramble situation.

First, the scramble team must have been informed at some earlier time that it is the immediately responsive gun team.

Second, the scramble team must have been assigned to mission ready aircraft with versatile weapons systems capable of engaging any expected target.

Third, the scramble team must be knowledgeable and trained to implement the SOP.

These constants may seem to be self-explanatory but are, in fact, requirements that must be carefully considered. For instance, a mission such as continuous convoy cover for a 5-hour road march would require a primary team and a relief team, based on the station time of the aircraft. If a scramble team requirement is levied in addition, the three teams must obviously be formed from available personnel and aircraft. Resources must be carefully allocated with the priority of versatile weapons systems assigned to the scramble team (since specific type targets are unknown, at this point). The third idea presented is obvious in that an SOP without personnel trained in its implementation is relatively worthless.

With the foregoing discussion in mind, imagine yourself closely observing a helicopter fire team going through its paces. The gun team is a scramble team; aircraft are assigned and operational; individual equipment is stored aboard the aircraft.

As the siren sounds, watch for responsiveness and coordination among the team members. The fire team leader insures that the aircraft commander (AC) of the wing ship and both pilots are simultaneously alerted. The team leader, who is also aircraft commander of the lead ship, immediately goes to troop operations and is presented as thorough a mission briefing as possible. This usually consists of a call sign, a radio frequency and a general area of engagement. The crews are briefed in the air.

The pilots proceed to their assigned aircraft. The first person to arrive unties the main rotor and stores the tiedown equipment. The pilots don protective gear, strap in and start their aircraft. They then await the arrival of their respective aircraft commanders.

**Although a good standard operating procedure (SOP) cannot cover all situations, it does provide a very firm foundation upon which orders can be based**

The wingship AC has gone directly to the crew living quarters and has alerted all remaining crewmembers. All then proceed rapidly to the aircraft. The crewchief and gunners are responsible for installing doorguns on their respective helicopters. The wingship AC insures by rapid inspection that weapons systems on both aircraft are properly installed and electrically connected. After satisfying this requirement, he dons protective gear, boards his aircraft and contacts the airfield control tower to obtain clearance and instructions for immediate departure.

By this time, the team leader has arrived at his aircraft with all available information. He boards his aircraft and immediately tunes to the frequency of the supported unit to establish radio contact. The team leader, by boarding his aircraft or by some prearranged hand signal, notifies his wingman to begin his takeoff run when cleared by the tower. The pilot of the lead ship observes this takeoff and without conversation falls in behind as the second ship in the formation.

It is the wingman's responsibility to lead the formation on takeoff in a safe, expeditious manner as directed by the control facility. When the two aircraft have cleared the airfield pattern and traffic, the wingship AC relinquishes the leading position to the team leader. He accomplishes this by directing the pilot to execute a 360-degree turn to the right (or left). The team leader simply passes him and the wingman assumes his trailing position in the flight.

As may be suspected by the use of the term "troop operations," this SOP was implemented within an air cavalry troop in the Republic of Vietnam—specifically D Troop (Air), First Squadron, Fourth U. S. Cavalry, First Infantry Division.

All actions described were performed by personnel with mechanical efficiency, with no verbal communication between any of the eight crewmembers. This helicopter fire team was alerted, reacted to that alert and cleared the airfield traffic pattern in an organized, safe, highly responsive manner with no orders given.

It should be understood that an SOP is not meant to cover all situations. Obviously, only routine actions can be accomplished in this manner. An SOP does however provide a firm foundation for instantaneous reaction upon which supplementary concise, clear and necessary orders can be based. In short, it provides a leader and his men with a prearranged plan of action to avoid what may otherwise turn into a chaotic circumstance.

# VIEWS FROM READERS

*Continued from page 1*

Classes are conducted by the Aviation Maintenance Training Department and are tailored to fit the needs of the students. An attempt is made to adapt the training to fit the maintenance system now used in the Vietnamese Air Force.

The students are assigned to a company in the First School Battalion and are housed and fed the same as American students. However they are supervised by a permanent cadre of Vietnamese officers stationed at the school.

★ ★ ★

The DIGEST has received numerous inquiries concerning the memorial scholarship fund established in honor of the late CW4 James P. Ervin (Ret.). Contributions should be made payable to the "AAAA Scholarship Foundation, Inc." marked for the "James P. Ervin Memorial Fund" and mailed to the foundation at 1 Crestwood Road, Westport, Conn. 06880.

Mr. Ervin was considered a pioneer in Army aviation development. He was one of the first to experiment with armed helicopters. He was a member of the first transportation company to be equipped with CH-34s and CH-37s. He was also a member of the first medium helicopter company deployed overseas.

In 1968 he set three world climb-speed records in the Sikorsky Skycrane. He piloted the helicopter to an altitude of 3,000 meters in 1 minute, 38.32 seconds; to an altitude of 6,000 meters in 3 minutes, 32.83 seconds; and to an altitude of 9,000 meters in 7 minutes, 57.44 seconds. He was awarded the Distinguished Flying Cross and two FAI (Federation Aeronautique International Diplomas of Record).

He retired in July of this year after 21 years of service. He was a veteran of both the Korean and Vietnam conflicts. In Vietnam he logged 220 hours in the Skycrane.

Mr. Ervin was killed flying a Skycrane while engaged in oil exploration in Alaska. The crash occurred 2 September on the north slope near Prudhoe Bay. He was 37 years old.

★ ★ ★

Lieutenant Doug Walsh of the 24th Combat Aviation Battalion tells us that in Vietnam there are no routine missions as indicated by the title of the story "Routine Mission" found on page 10. After making what he thought was a routine administrative run he set his helicopter down at Hotel 3 helipad in Saigon.

Suddenly there was a blood-curdling scream coming from the vicinity of the doorgunner's seat.

"When I turned I thought the aircraft was on fire," Walsh said. "All the passengers were running around in the rain like mad, pointing to the gunner's well."

Looking for himself, Walsh discovered a 6 foot snake lounging under the seat. After deciding that it wasn't necessary to have an artillery strike to dislodge the snake, the crew used the rotor blade tie-down rod to flip the snake onto the pad

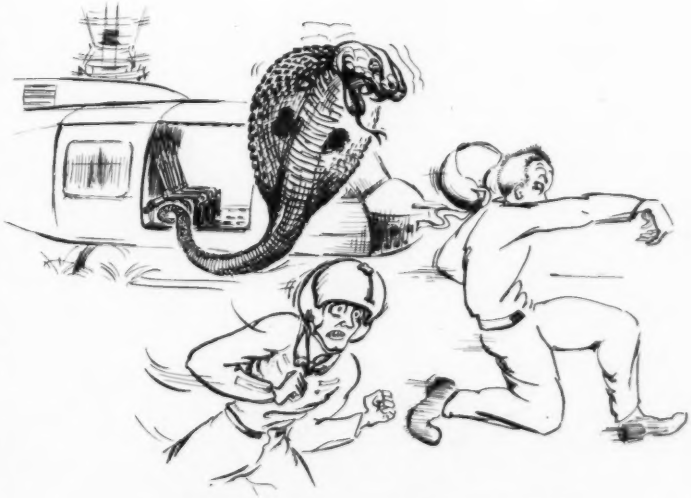
By this time, Specialist 4 Mike Anders had grabbed an M-16 and was about to let the snake have it, but Specialist 4 Howard Hodge seized the weapon and illustrated the effectiveness of a horizontal butt stroke to the snake.

They gave the snake a military funeral on the return trip to their Dong Tam home in the Mekong Delta. Sliding him out the door into a rice paddy, they further graced his "burial at sea" with a verbal epitaph, "If God had meant for you to fly, he would have sent you to Ft. Rucker."

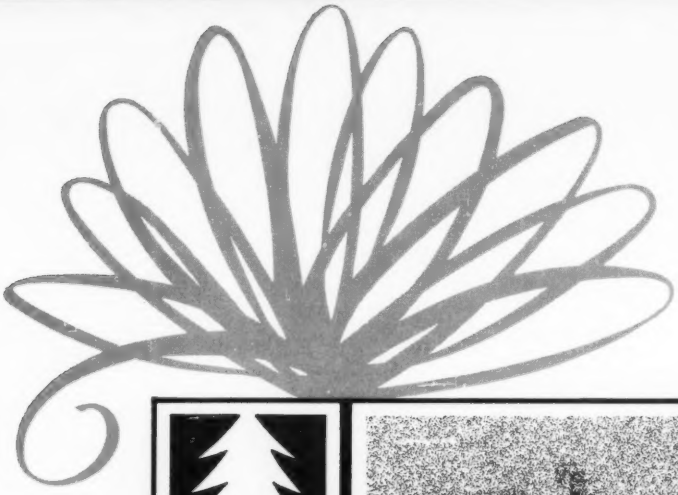
★ ★ ★

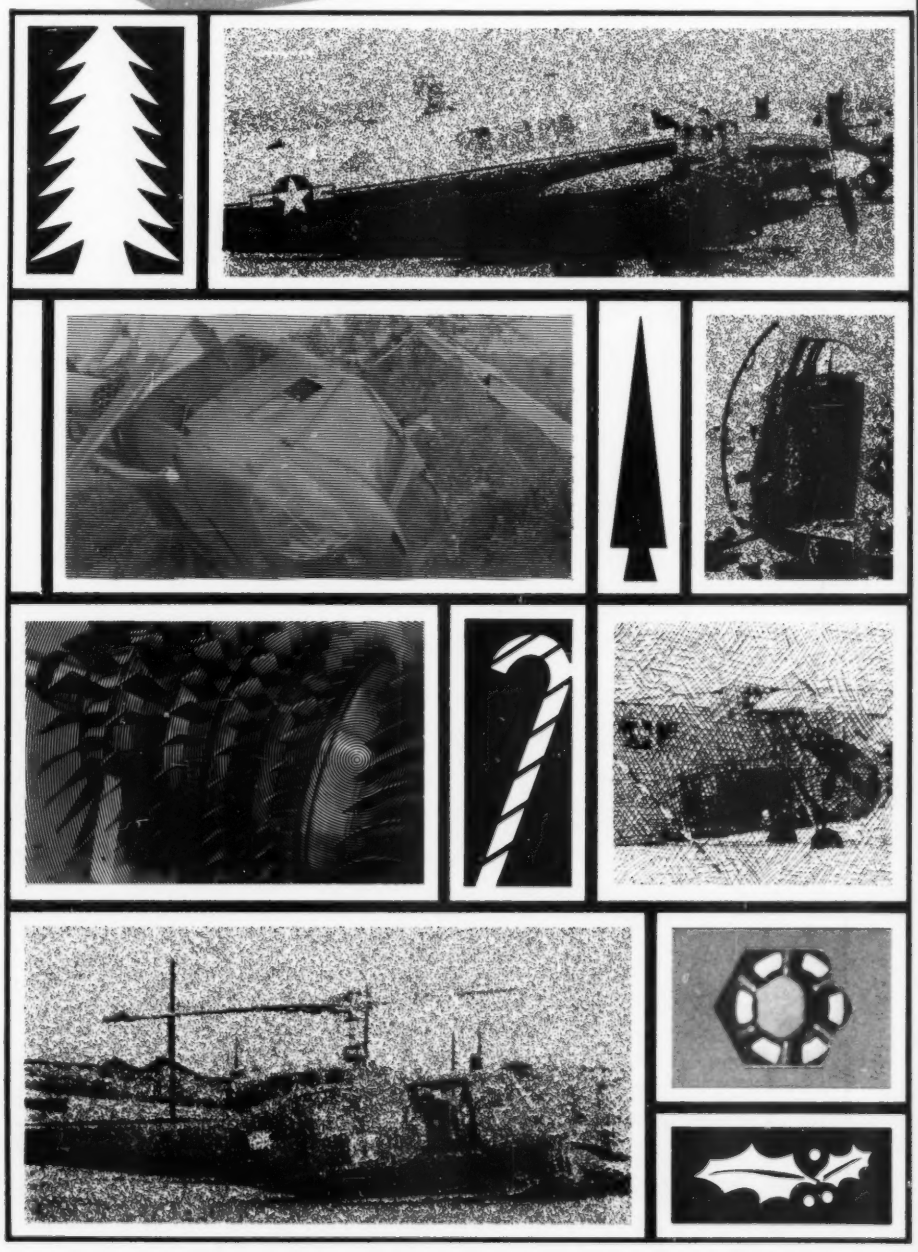
The Army Transportation Corps is looking for a motto and asked the DIGEST to help. They will award a $200 U. S. Savings Bond to the person who suggests the selected motto. The contest is open only to the officers and men of the Transportation Corps.

Entries should be submitted to the chairman of the Transportation Corps Motto Committee, Office of Doctrine Development, Literature and Plans, Army Transportation School, Ft. Eustis, Va., 23604. The contest closes 28 February 1970.



SORRY GUYS, I THOUGHT THIS WAS A COBRA





THESE COULD BE the most expensive and beneficial Christmas gifts you'll ever receive, if you'll open your mind, admit you're not infallible to error and apply the lessons to be learned from the mistakes of others to your tasks and areas of influence in Army aviation. That, after all, is what accident prevention is all about.

Mountains of statistics will not prevent accidents, nor will the comparison of rates between commands and units. These are after-the-fact measurements of accident history in numbers only. What *will* prevent accidents is application of the lessons learned through understanding the circumstances and cause factors of each accident and the vital knowledge of *WHY* cause factors existed and resulted in accidents.

Many accidents may result from similar cause factors—overloaded aircraft, for example. But the reasons the cause factors existed and resulted in accidents can vary as widely as the appearances, personalities and abilities of the people involved. Unless you know these reasons and why they existed, you are not equipped to prevent similar future accidents.

The members of the aircraft accident investigation boards who reported the following accidents and the reviewing officials, approval authorities and analysts have done their best to explain the reasons why the cause factors existed. They were expensive accidents in terms of lives, injuries, dollars and loss of combat resources. As you read about them, please keep an open mind and profit from these gifts of experience. The lessons they teach are your best prevention tools.

# NO HOVER CHECK FOR OVERLOAD

A UH-1C CREW had completed their missions for the day, refueled and parked at a forward base, waiting to make the return flight to their base.

*AC:* "At approximately 1645, we started the engine for the return flight to base. All instruments were in the green and we had 800 pounds of fuel. I was flying in the left seat to give the pilot some stick time in the right seat. He proceeded to pull out of the revetment and put the aircraft back on the ground. During this maneuver, the engine rpm bled off to 6000.

"When we were ready for takeoff, the pilot started the takeoff to the west. We cleared a muddy roadway and were bleeding rpm. We continued to bleed rpm and I took control when it reached 6000.

"With the momentum we had, I thought we were close to transitional lift and elected to continue the takeoff. Over the concertina fence barrier, I saw the rpm at 5600 and it was evident we were not going to get airborne. I lowered collective and tried to cushion it onto the rough and muddy slope. We had too much momentum at first touchdown and came back off the ground. The ship went straight ahead for approximately 20 to 25 feet, touched down again, rolled forward slightly and the tail swung around to the left. The aircraft came to rest facing the takeoff path and rolled on its left side at an approximate 45-degree angle. . . . It was noted afterwards that we had taken off with a quartering tailwind estimated at 5 knots. We never made it into transitional lift."

*Pilot:* "The AC had been training me to be a team leader in the gun platoon all day and had let me fly in the right seat for the last flight. He also told me that I would be flying the right seat back to our base. . . . During the day, I noticed that both $N_1$ and $N_2$ needles were fluctuating 60 to 70 rpm in what I thought was a peculiar manner. But we attributed this to the gauge being relatively new to the ship. I also noted the rpm would not be exactly where you set it a few seconds after you beeped it up. But it was not really causing any undue problems. . . . Runup was normal, with the rpm still wandering the same amount. The AC told me I had the ship.

"As I hovered out of the revetment, the AC applied left pedal so he could see if the wing ship had cranked. Before putting our aircraft down, I noticed the rpm was down to 6000. I attributed the low rpm to the left pedal applied by the AC. Satisfied the wing ship had cranked, the AC made the call to the tower and motioned for me to take off.

"I lifted the ship off and the rpm was 6200 and bleeding before we reached a large muddy section with deep ruts. We were at a 9-inch hover, with the rpm at 6000 and the AC pulled in power. We cleared the rutted section, but the windshield was spattered with mud.

"Halfway over the puddle, I saw that the rpm was 5800 and bleeding. The AC took the aircraft at this point. The rpm was 5600 as we reached a helicopter length past the mud. I don't know if the AC pulled in more pitch to clear the wire or not, and I don't know how far past the wire we first hit the ground, but the skids were straight. We hit the ground a second time and the helicopter veered right toward a bank and tree stump. I don't remember it turning 180 degrees, but I remember it rolling over on its left side. . . . No one was injured. All during this takeoff, the ship did not seem to have the same power it had earlier in the day.

"We both knew we had never attained transitional lift. But I know we had an unusual amount of forward movement. I thought it was never going to stop moving forward. Later, we were informed by someone who had seen a windsock that we had taken off downwind."

Overloaded Huey strained to make it, but lost rpm and crashed during attempt to take off without hover check

*Report analysis:* "Weight and balance computed on DD Form 365F showed the actual takeoff weight was 8,460.8 pounds. Referring to page 14-19, chart 14-7, TM 55-1520-220-10, dated January 1968, and using the estimated conditions which existed at the time (2,750-foot pressure altitude and 25 degrees C outside air temperature), the allowable gross weight overload limit (100 fpm rate of climb) was computed to be 7,500 pounds. Consequently, the aircraft was approximately 960 pounds above maximum allowable gross weight when the takeoff was attempted.

"A hover check, in accordance with current unit directives, was not performed prior to the attempted takeoff. An interview with the AC indicated that he considered the lateral hover from the revetment parking area to the takeoff lane to have been the hover check. However, as noted in his and the pilot's statement, the rpm bled off to approximately 6000 during this maneuver. The AC and pilot attributed this loss of rpm to the fact that the AC applied left pedal during the maneuver to check on the progress of his wingman. Regardless of the reason given for the loss of rpm, the AC should have performed the prescribed hover check.

"It is felt that the AC used poor judgment by not aborting the takeoff before reaching the concertina wire fence. After he had applied additional collective to make it over the muddy roadway, the rpm was noted to be 5800 and decreasing. The AC did take control at this time and there was approximately 300 feet of the takeoff lane remaining before reaching the fence. With the rpm in a critically low state, he should have aborted the takeoff.

"Two instances occurred during hovering and the attempted takeoff which indicated a lack of supervision on the part of the AC. Both instances deal with crew coordination or, more specifically, control of the aircraft. The AC pushed left pedal to turn

the aircraft while the pilot was at the controls during the initial lateral hover. Also, he increased collective pitch while the pilot was at the controls during the attempted takeoff. Both of these actions on the part of the AC were contrary to good flight procedures. The AC should tell the pilot to make the desired control movements or assume full control of the aircraft and make the control movements himself.

"It was noted during the investigation that the possibility existed that the takeoff attempt was made with a quartering tailwind. However, there was not enough evidence to definitely establish the wind condition and no finding was made regarding the effect of wind on the takeoff. It was also noted during the investigation that there was no visible wind indicator located at the forward base. This fact was brought to the attention of the unit commander and a wind indicator has been erected."

*Report findings:* "AC and pilot failed to determine, either by weight and balance computation or prescribed takeoff hover check, that the aircraft was within gross weight limitations for the existing conditions before attempting the takeoff.

"The AC failed to abort the takeoff when the rpm became critically low.

"The AC made control applications while the pilot was in control of the aircraft."

*Recommendations:* "That the need to accomplish the prescribed takeoff hover check be reemphasized to all aviators.

"That flight standardization personnel establish definite guidance regarding assumption of aircraft control.

"That the facts and circumstances involved in this accident be widely disseminated."

*Reviewing official:* "Concur with the findings and recommendations, with these exceptions: It is apparent that the accident occurred because the AC failed to abort the takeoff when the rpm continued to decrease below minimum safe operating limits. However, it should be pointed out that the present tactical mission is such that gunships are required to operate in an overloaded condition on a daily basis. If the UH-1C gunship is to continue to be employed and, unless we are willing to risk the high probability of recurring accidents, such as the one in this report, we must either accept a less effective performance on target by reducing the basic load of ammunition or we must install a more powerful engine which is more compatible with mission requirements.

"Although evidence was not found to clearly indicate that the takeoff was attempted with a quartering tailwind, the fact that there was no wind indicator in the forward area should be included in the findings as supervisory error on the part of the company. It is noted that this situation was immediately corrected when brought to the company's attention.

"A command letter has been sent to subordinate units which establishes definite standard procedures for transferring aircraft control. . . ."

*Letter concerning transfer of aircraft control:*

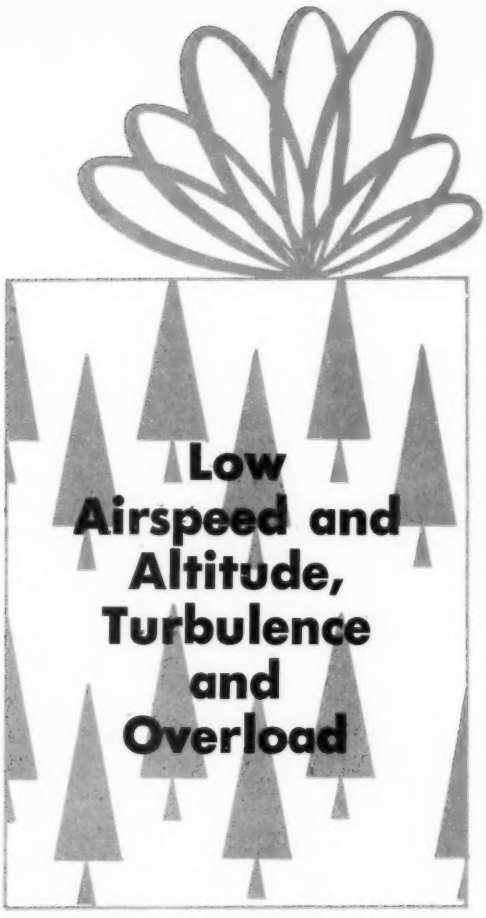
"1. The investigation of a recent aircraft accident in this command revealed that the aircraft commander was making control applications while the pilot was hovering the aircraft and attempting a takeoff. These control applications were made by the aircraft commander without informing the pilot. This practice is totally unsafe and could easily have caused the pilot to lose control of the aircraft.

"2. All aviators of this command will insure that positive aircraft control is maintained at all times. The aviator assuming control should do so as smoothly as possible and insure that his intentions are fully understood by the other aviator.

"3. The following procedure for transferring of aircraft controls will be incorporated into all subordinate unit SOPs:

"a. Aviator assuming control of the aircraft will say, 'I have the controls,' or 'I've got it.'

"b. Aviator relinquishing control of the aircraft will say, 'You have the controls,' or 'You've got it.' "



# Low Airspeed and Altitude, Turbulence and Overload

AN OH-6A, WITH PILOT, observer and crewchief aboard, was on a flight from one airfield to another to drop off the crewchief. Enroute, the pilot who was flying No. 2 position in a flight of two OH-6As, and the flight leader were diverted to recon a road through a hilly pass. The surface wind was from the southwest at 15 knots, with gusts to 20 knots. The density altitude was 2,060 feet and there was light turbulence.

*Pilot:* "We started our recon and were moving west along the road. After traveling approximately 2½ miles, the lead ship entered a tight draw. Due to the lead ship's slow airspeed, approximately 20 knots, I was forced to make 360-degree turns behind it. Because of the wind and light to moderate turbulence, I held my airspeed as near 40 knots as possible.

"After making about three 360-degree turns with everything normal, the aircraft suddenly pitched into a nose low attitude and started a violent right spin. I was crosswind at the time, 40-50 feet above the ground and 15-20 feet above the trees. The airspeed was 30-40 knots and all gauges were in the green.

"I lowered pitch, added left pedal and tried to fly out of the spin. Because of our low altitude, this was not accomplished. At about 10 feet, just prior to ground contact, I pulled full aft left cyclic and was able to obtain a skids-level attitude. . . ."

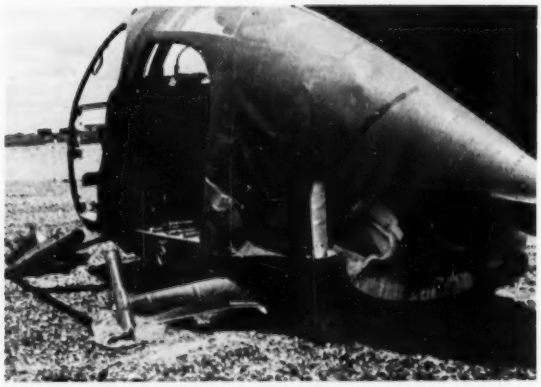
*Report:* ". . . Impact with the ground was made with a tremendous downward force in a skids-level attitude. There was no evidence to indicate the aircraft was still spinning when it hit the ground. Both skids were collapsed to a point above the bottom portion of the fuselage. The engine access doors were bowed out away from the fuselage and the bottom portion of the engine made contact with the ground.

"The engine was not operating after impact. The fuselage was bent in the vicinity of station 78.5 and the right rear troop seat had buckled and collapsed to the aft cargo floor. The tail boom was struck by one main rotor blade, causing a large dent in the aft portion. Both tail rotor blades were severed and the lower vertical stabilizer was bent and severed at the attaching point. The forward tail rotor drive shaft coupling had pulled away from the transmission tail rotor drive assembly.

"The crewchief, sitting in the right rear troop seat which collapsed at impact, sustained the most severe injury, a spinal compression fracture. The pilot had chest, back and chin abrasions from impact and the observer's knee hit the console and his chin hit his chest protector, causing abrasions.

"The pilot stated that his corrective action when entering the spin was to lower collective and apply left pedal in an attempt to fly out of it. Inspection of the cockpit at the scene of the accident revealed the collective in the up position and damage to the

**Loss of directional control downwind with low airspeed at low altitude resulted in impact estimated at more than 20 g's and strike damage to aircraft**



main rotor, tail boom and tail rotor indicated low rotor rpm at impact. It is estimated the aircraft struck the ground with a force greater than 20 g's, indicated by the condition of the right rear seat which is stressed for a force of 20 g's. A search of the accident scene and surrounding trees and obstacles revealed no evidence of a main rotor or tail rotor strike.

"An estimated weight and balance computation indicated the aircraft was over maximum allowable gross weight by 166 pounds. The c.g. was within limits. At the time of the accident, the gross weight was over maximum by approximately 44 pounds. The forward c.g. limits were exceeded by 2.4 inches due to the forward movement of the c.g. as fuel was consumed.

"A downwind right turn performed at low altitude and low airspeed in gusty wind conditions resulted in the tail yawing excessively to the left. This produced lift on the horizontal stabilizer surface, causing the nose to pitch down and to the right. At this point, directional control was lost and the aircraft began to spin to the right. Forward airspeed was lost completely and it is suspected that the pilot lost control and inadvertently applied collective. . . . The aircraft continued to lose rotor rpm in a flat spinning descent and impacted the ground.

"Contributing factors were the pilot's experience level (he had 11 hours total in the OH-6A and had completed his dual checkout the previous day); the high gusty wind condition and light turbulence which introduced control problems with the aircraft; and the fact that the aircraft exceeded weight and balance limitations, causing a high gross weight and nose heavy, forward c.g. condition at the time of the accident. The contributing factors in this accident indicated a lack of knowledge of OH-6A flight characteristics during downwind and crosswind flight. With high gusty winds, flight in the downwind low airspeed envelope is characterized by random aircraft motions, large control requirements and a general increase in pilot workload."

*Recommendations:* "That increased emphasis be placed on weight and balance limitations of the OH-6A; that, when possible, OH-6A scout pilots receive a minimum of 10 hours dual mission pilot training with a rated OH-6A pilot before being released to fly missions; and that all OH-6A pilots be reminded of the hazardous flight conditions associated with low airspeed, low altitude flight in high downwind gusty conditions, namely the instability of the aircraft characterized by random aircraft motions, large control requirements and a general increase in pilot workload. Attention is invited to paragraphs 5a and 6, chapter 8, TM 55-1520-214-10, the OH-6A Operator's Manual."

*Reviewing official:* "Concur with the findings and recommendations of the investigation report. The circumstances surrounding this accident have been disseminated to all aviators in this command. Mission load for the OH-6A consists of a pilot and observer, 400 pounds of fuel and 2,000 rounds of minigun ammunition. This was reiterated to all personnel.

"The danger inherent in slow downwind flight in the OH-6A has been covered in detail, both orally and in writing. The pilot in this accident was aware of this inherent hazard. It has been made SOP that each newly qualified OH-6A pilot will receive a minimum of 10 hours mission time with a rated OH-6A pilot. This will take place after the pilot becomes OH-6A rated and before he is cleared for solo flight on missions. . . ."

*Report indorsement:* ". . . Attached is a 365F weight and balance form. These computations were made using the actual weights of the personnel and equipment on board the aircraft. . . . Analysis of this form indicates the aircraft exceeded maximum gross weight at the time of takeoff (127 pounds), and remained in that condition until the time of the accident (7 pounds). C.g. limitations, however, were never exceeded and remained well within the design envelope (100.6). . . ."

*Subsequent report indorsement:* ". . . The weight and balance form submitted in the previous indorsement is in error. While it is properly computed, an error was made in determining the takeoff c.g. and landing c.g. The takeoff c.g. should be 96.7 inches and the landing c.g. should be 96.5 inches. This aircraft was, in fact, overgross and out of c.g., although not to the extent stated in the investigation report."

A UH-1D LEFT ITS base at about 0500 to fly command and control missions in support of a unit working out of a fire support base. Missions supported throughout the day were uneventful. At about 2050, the crew was informed that they were to fly to a ship anchored in the river near the fire support base to pick up a passenger and return him to their base where they would be released.

*Pilot:* ". . . The ship had moved to a point just off the fire support base so I made a large slow circle to the left and rolled out on final inbound to the ship. When I made the turn from base to final, visibility was fair to good and I could see the ship. I also had good radio communication with the ship.

"On rollout to final, the altimeter read 900 feet indicated and I began a slow descent. There were a number of flares being shot and the smoke from the flares became a visibility factor. After descending on final for a short period with a slightly steep sight picture, I flew into what I assumed was flare smoke. This obscured my view of the landing deck and it became dim and fuzzy, but I still had what I considered safe visual contact with the deck.

"I held this sight picture for a few seconds and then we broke out of the smoke, or cloud cover. Then we were back into what looked like the edge of a cloud of smoke. I saw my airspeed was dropping off and commented to the copilot, 'I'd best not come to a hover this high.' The altimeter was reading 300 feet indicated and the airspeed was 35 knots. I lowered the nose slightly to gain airspeed. It increased toward 40 knots, then the aircraft impacted the water, rolled to the right and sank rapidly.

"When I rose to the surface, the crewchief and copilot were already up, but I did not see the gunner. After approximately 4 to 7 minutes in the water we were picked up by a small barge."

The pilot, copilot and crewchief were rescued, but the gunner drowned. The aircraft was not recovered. A small section of the tail boom was recovered 2 days after the accident.

*Questions asked pilot:*

"Did you go to the messhall on the morning of the accident?"

"No, due to my past experience of going there and breakfast not being ready."

"When did you last reset your altimeter?"

"Approximately 2 hours prior to impact."

"Did the two altimeters agree?"

"Yes."

"What was the altimeter setting at the time of the accident?"

"Three hundred feet."

"Did you notice your low altitude?"

"No."

"Did you increase pitch during or after the nose was tilted to gain airspeed?"

"Not to my knowledge."

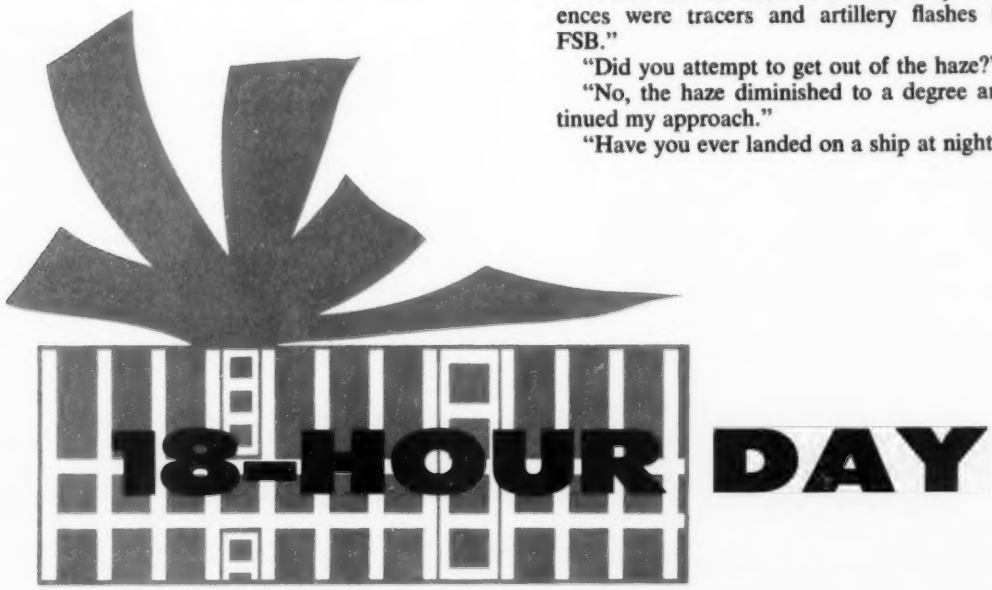
"What was the visibility?"

"There was no horizon and the only visual references were tracers and artillery flashes from the FSB."

"Did you attempt to get out of the haze?"

"No, the haze diminished to a degree and I continued my approach."

"Have you ever landed on a ship at night?"



"No."

"At what point did you notice the vertical speed indicator?"

"After I was established on final."

"How did you hit?"

"Level."

"Do you smoke?"

"Yes."

"What quantity per day?"

"A pack and a half."

"How many cigarettes did you smoke during the day of the accident?"

"More than usual, in excess of two packs."

*Copilot:* ". . . We had a 0315 wakeup and a 0500 takeoff. . . . I had been over to the messhall a couple of days before and had not been able to get any breakfast. We cranked at 0455 and took off at 0500. . . . Around noon, we had a can of C rations and that was all the food we had all day. We had found some rations that evening and had just started to heat some water for them when we were called to go fly again. . . . The weather was poor. We had low ceilings most of the day and there was heavy rain off and on most all day."

*Questions asked copilot:*

"Did you notice your low altitude?"

"No."

"What was your altitude as you started on final?"

"It was 600 to 800 feet."

"Did you notice the rate of descent?"

"No."

"Did you notice any unusual attitude?"

"No."

"What was the visibility?"

"Flares were present, causing loss of night vision. Before we turned final, the flares went out and we ran into some haze or mist."

"Did you attempt to get out of it?"

"It was of such short duration that we made no attempt."

"How many layers did you pass through?"

"Two or three, for a short period of time."

"Was the area lighted with flares all this time?"

"The only time I noticed was prior to turning final."

*Report analysis:* ". . . Reported weather in the vicinity of the ship was light precipitation, no visible horizon, 90 percent cloud coverage and no moon.

"The pilot and copilot stated they had flown 10 hours just prior to the accident and had eaten only one can of C rations during the past 18 hours. This in itself can induce increased fatigue and reduce reaction time. These factors, coupled with darkness, flares, limited visibility and light precipitation, is considered by this board as positive evidence of spatial disorientation as the cause of this accident.

"The pilot had a total of 452 flying hours and the copilot 271 hours. The pilot had not made a night approach or landing to a ship, an indication of a lack of crew experience.

"The pilot and copilot stated they noticed the airspeed indicating 35 knots at approximately 300 feet and the aircraft impacted about 4 to 5 seconds later. This could have resulted from an altimeter error or an excessively high rate of descent. The pilot stated that he dipped the nose of the aircraft to regain airspeed, but could not recall if he applied additional power. Dipping the nose, without applying additional power, could have induced a high rate of descent, causing the aircraft to impact from 300 feet within 4 to 5 seconds. If this occurred, it is evident the copilot was not monitoring the flight instruments, thereby preventing a warning of imminent danger."

*Flight surgeon:* "Reconstruction of the events leading to this accident makes spatial disorientation the most likely cause, although a faulty altimeter cannot be totally excluded. Certainly, conditions were such that disorientation could readily occur. It was a dark, moonless night with no visible horizon, poor weather conditions and there were many flares with flare smoke.

"Contributing factors are fatigue after an 18-hour day, compounded by hunger and possible hypoglycemia from lack of adequate nourishment during the day. The excessive smoking would tend to reduce the crew's night vision, as would the flares. The pilot

smoked over two packs on the day of the accident and the copilot smoked one and one-half packs. . . . the pilot had never made an approach and landing to a ship at night."

The flight surgeon's recommendations included: "Breakfast should be available 24 hours a day in the messhall and all crewmembers encouraged to eat it.

"All crews should be given at least one-half hour downtime each 4 to 6 hours for a hot meal, if available, or at least a complete meal of C rations and an opportunity to get out of the cockpit and exercise. . . .

"Escape procedures for land and water crashes should be rehearsed with all crews at frequent intervals."

The board listed spatial disorientation as the established cause factor. Probable or suspected cause factors were weather obstruction to vision, poor copilot technique in not monitoring instruments on approach, fatigue, lack of nourishment, lack of experience and altimeter error. Its recommendations were: "Continuous emphasis by safety officers and flight surgeons at safety meetings concerning causes and effects of spatial disorientation.

"Mess facilities be made available for flight crewmembers with early departures.

"Command emphasis allowing aviators time for meals at supported units.

"Command emphasis placed on assignment of inexperienced aviators with experienced aviators.

"Hooded flight become a part of the 90-day standardization flight check.

"Both pilots be given postaccident check rides, to include hooded flight."

*Reviewing official:* "Concur with the finding of spatial disorientation as the cause of this accident. The established cause factor is amended to read: Spatial disorientation resulting from marginal weather, fatigue, lack of nourishment, lack of experience and altimeter error.

"Nonconcur with the probable or suspected cause factors listed by the board. The following probable or suspected cause factors have been determined in this accident:

"Probable pilot fatigue. The fatigue resulted during an 18-hour work day which included 10 flying hours, involving constant attention to detail and the exercise of skill in the operation of a complex machine.

"Probable pilot error. In an 18-hour day involving 10 flying hours, the pilot made no apparent effort to insure that he and his crew were provided adequate nourishment during 8 nonflying hours. This lack of nourishment compounded the effects of fatigue.

"Suspected pilot error. Failure to check and, if necessary, reset the altimeters immediately prior to this flight.

"Actions taken to prevent recurrence of this type accident were: The next scheduled aviation safety meeting will include a presentation by the flight surgeon on the causes and effects of spatial disorientation. In addition, the flight surgeon will prepare a handout to be distributed as required reading by newly assigned aviators.

"Mess facilities have been available for flight crewmembers with early departures. A more varied menu is now available.

"The responsibility for having rations available and seeking adequate time for meal consumption rests with the pilot or aircraft commander. Except for a tactical emergency, it is unlikely a supported unit would refuse a request for time for meal consumption. Supported units have been requested to provide sufficient mealtime for crewmembers.

"This command makes every effort to insure crews are assigned missions on the basis of experience. It is unlikely that every experienced aviator will have encountered every conceivable flight situation by some magic flying hour number. The cause factor in this accident, disorientation, can occur at any experience level with the same result.

"Aviators are enjoined to conduct hooded flight during some phase of flight which will not conflict with scheduled missions. There are no aircraft available exclusively for training.

"This accident will be discussed at the next scheduled safety meeting and particular emphasis will be placed on the importance of altimeter settings incident to flight into known or suspected marginal operating conditions.

"A command regulation directs that unit SOPs reflect the requirement for copilots to monitor engine/flight instruments and call off significant adverse indications during low level operations.

"The pilot and copilot were given postaccident check rides."

A UH-1H WAS ON A mission to resupply troops at an LZ.

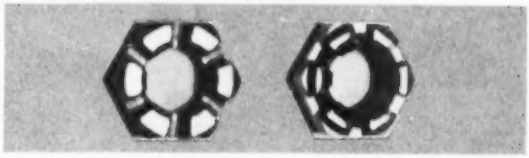
*Report:* ". . . After landing at the LZ, four passengers departed and another passenger boarded for the return trip. A delay of 10-15 minutes was required while the rigging crew at the LZ prepared a water bladder to be extracted by sling. The AC elected to maintain 6600 rpm throughout this delay because of the tactical situation.

"When the load was finally rigged for extraction, the helicopter was raised to a hover and backed into position for hookup. Just before the hookup was made, the aircraft started to turn slowly and uncontrollably to the right. The AC recognized tail rotor failure, moved to clear the load and made a hovering autorotation. The helicopter touched down gently, but on a steep slope. The main rotor blades hit stumps on the uphill side and the aircraft rolled down the slope onto its left side.

"The crew got out through the righthand side which was the top of the wreckage. There were no injuries during the accident, but the pilot sprained his ankle when he jumped to the ground. . . .

". . . In checking the maintenance records, it was discovered that the tail rotor assembly had been replaced only 3 days before because of a blade strike. Disassembly of this unit revealed that the bearing retaining nut on the end of the pitch change quill had been loose, allowing the inner race of the outer bearing to turn against the retaining washer. There was evidence of a great deal of heat in this area and the washer was welded to the retaining nut. The cotter pin was sheared by the castellated nut and the center piece was still in the quill. The nut backed

Photo shows comparison of incorrect (left) and correct retaining nuts



off of the quill and at that instant the AC lost pedal control.

"Further investigation revealed that the nut which failed was a hexagon slotted nut (P/N AN320-5, FSN 5310-176-8109). The proper nut for this installation is a self-locking castellated nut (P/N MS17826-5, FSN 5310-961-8393). The improper nut is an item of common hardware. The proper nut is a special part, apparently not available in this command. . . .

"It is suspected that two other factors may have contributed to the failure. First, the frequent removal and replacement of this item may have worn or damaged the threads to the point that maintaining the proper torque was improbable. Second, since this is a keyed castellated installation, the mechanic may have torqued the nut properly, then backed it off to align the castellates with the key hole, thus detorquing it."

*Finding:* "This accident was caused by improper maintenance procedures involving the use of an improper part, and suspected improper installation procedure."

*Recommendation:* "That all maintenance personnel be made aware of the cause of this accident. This is an outstanding example of how a small maintenance error in the installation of a part of insignificant value can directly cause destruction of an aircraft."

*Report analysis:* ". . . .Supervision will be included as a contributing factor. The supplemental crash facts message for this accident stated: 'The wrong nut was being used because the proper nut was not available through supply channels.' Coordination with a responsible agency did not substantiate this statement. It is strongly recommended that only the components specified by maintenance manuals (—20 or —35) be used. . . ."

# A Part of Insignificant Value

UH-1D AC: "At 1,500 feet, I told the pilot we would run through a practice engine failure and rolled the throttle back slowly to establish 6000 engine rpm. He went through the proper procedures and, at approximately 800 feet, I saw the rpm dropping and told him to add throttle. He said the engine did not respond to the throttle and I took control and checked the full range of the throttle, with no response from the engine.

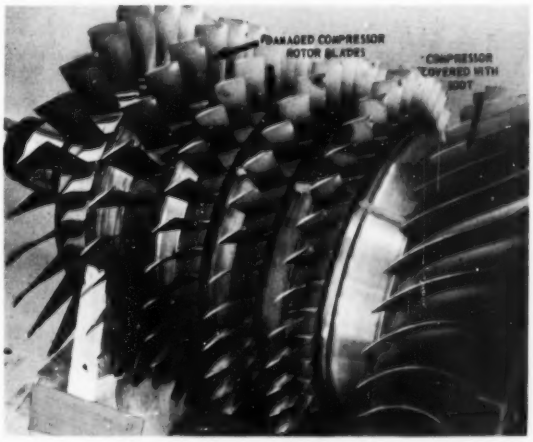
"We were autorotating over a large rice paddy area and I chose a touchdown point, flared and pulled pitch to cushion my landing. At the last moment, I saw that we would sit down on a 3-foot dirt mound, extended the approach and landed with forward motion. The skids and cross tubes were pushed to the rear and the helicopter came to rest on its belly. . . ."

*Report indorsement:* ". . . This accident was a result of interrupted engine power and an improper autorotation. . . ."

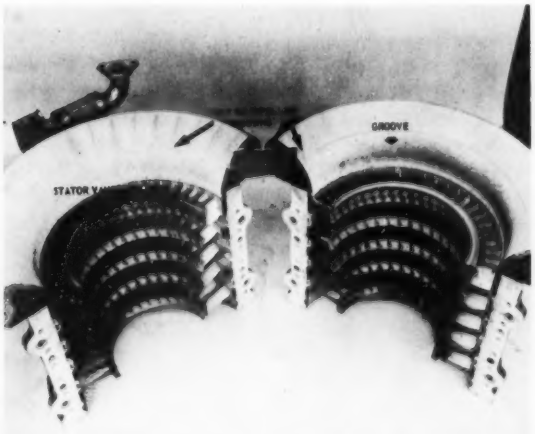
*Report:* ". . . It was discovered that neither the AC nor pilot had inspected the engine filters. This inspection had been signed off by the crewchief every day for the past 2 months."

*Laboratory report on engine teardown analysis:* "The cause for the engine malfunction was found to have been foreign object damage. A foreign object was ingested through the engine air inlet into the compressor rotor assembly. This damaged the compressor rotor blades and stator vanes, disrupting the airflow through the compressor rotor assembly and causing a compressor stall. . . ."

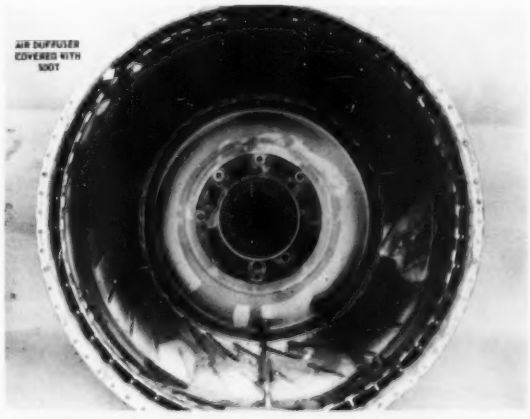
# FOD




Approximately 70 percent of the blades on the compressor rotor assembly were nicked and dented. This damage was caused by the foreign object as it was ingested through the compressor rotor




Stator vanes in the compressor housing were chipped and bent. This was caused by the foreign object being trapped between the compressor blades and stator vanes. A deep groove was cut into the face of the impeller housing, probably caused by either a particle from one of the compressor rotor blades or the foreign object being trapped between the impeller and the impeller housing




The compressor rotor, impeller housing and air diffuser (arrow) were covered with soot, indicating a compressor stall, caused by the damaged compressor blades and stator vanes

# MULTIPLE FACTORS

A U-21 PILOT arrived at the airfield at 0625 for a takeoff at 0700. He flew a number of missions during the day and was approaching his home airfield on the return flight at approximately 1715.

*Pilot:* ". . . Visibility was reduced considerably as I arrived near the coast and I worked with GCI until I was 35 miles southeast of the field. I tuned the VHF to tower frequency and monitored weather and landing instructions for some other aircraft. I called the tower, reporting 25 miles southeast, and did not get an answer. I called again and received instructions to report left downwind for runway 21. . . .

"When we were approximately 15 miles out, an airliner departed with a left turn to 140 degrees and I had difficulty seeing it, but I did see it soon enough to insure that he would be well clear and pass above and to our left. I continued and reported entering downwind, made my prelanding check and started to turn base. The tower told me to extend my downwind to follow another aircraft that was on final for a straight-in approach.

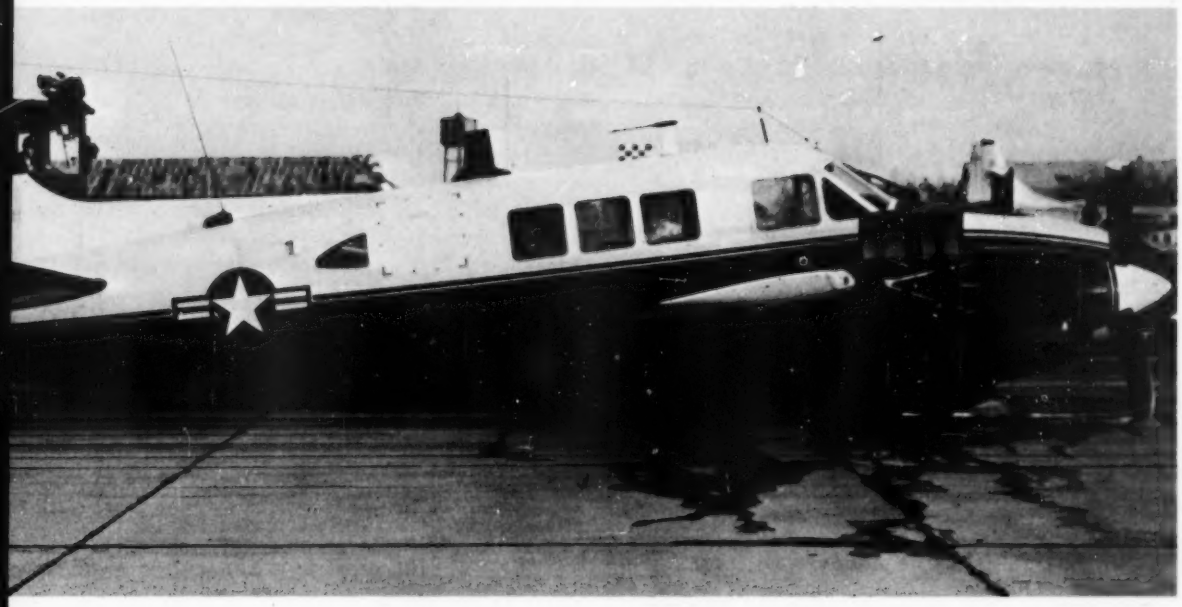
"I extended the downwind, but could not see the aircraft on final and asked for his location. Then I saw it, but it didn't look like the kind of aircraft the tower had reported. I told the crewchief that there was probably another aircraft and to help me look for it. . . .

"I turned base as soon as the other aircraft passed out of my way and put my hand on the gear handle, but did not lower it because I remembered being cautioned by the unit IP that if I put the gear down so far out and had an engine failure I would not be able to make the airfield. . . . I stayed higher than normal and reported final 2½ miles behind the other aircraft, then made a crosscheck in the cockpit which I found to be extremely difficult because of the sun striking me in the face. As I reduced power to 300 pounds torque, I remarked to the crewchief that I sure would be glad when we got some sun visors back in the aircraft because I could hardly see anything.

"I saw the other aircraft was on short final, checked the base leg for other aircraft and considered the possibility of having to go around due to turbulence from the aircraft ahead. By this time, we were over a village off the end of the runway and I checked my airspeed, placed the gear handle in the down position and checked three in the green.

"I saw the other aircraft was well under control

Fatigue, distractions and into-the-sun approach contributed to this gear-up landing



on the runway and I was higher than normal, so I checked the flaps, crosschecked the airspeed between 100 and 110, pulled the nose up enough to get the airspeed down to 100 and eased the prop levers forward. . . . The tower cleared me to land and the other aircraft was clearing off the runway. . . .

"I made smooth reductions in power and then started rounding out. Just as the aircraft should have been touching down, I received a warning horn, which I thought was a stall warning, because it went on and off. At that instant, the propellers nicked the cement, throwing up a spray. I pulled up slightly on the nose, checked inside and saw the gear handle was in the up position with the red light on. I held the aircraft off as long as possible. . . . It continued down the runway to a stop. . . ."

*Report analysis:* ". . . Although the pilot said he placed the gear down and checked the indicator lights, the physical evidence and witnesses' statements confirmed that the gear handle was in the up position and the gear retracted at touchdown. A retraction test proved the gear system functioned normally, including the lights and horn. Based on those facts, the board concluded that the pilot did not put the gear down during the approach.

"A flight test was made, duplicating the conditions of the pilot's approach. In that configuration, no handling characteristics were experienced that indicated the gear was not extended. This test also showed that the warning system did not activate until power was reduced below 250 pounds of torque.

". . . Aircraft records revealed nothing that could have contributed to the accident. The flight and work records of the pilot for the 4 days up to the time of the accident showed that he had flown 21.1 hours during that period and that extremely long duty days were involved. The first takeoff on the day of the accident was made at 0700. Allowing time for planning, filing and transportation from quarters, making a takeoff at that hour required him to get up very early. The previous day's mission was not completed until 1900, indicating a probable short night of sleep prior to the mission. He had flown 8:05 hours the day of the accident. Based on this, fatigue is considered to be a contributing factor.

"The tape recording of the tower transmissions showed that a distraction was produced in the form of instructions to extend the downwind leg to follow another aircraft at about the time when the landing gear would normally be lowered. The crewchief

stated that the pilot had his hand on the landing gear handle at the time these instructions were issued. The pilot elected to leave the gear up to avoid flying a wide pattern with it extended. It is felt that this distraction disrupted his normal habits, resulting in the assumpton that the gear was extended.

"The weather at the time of the accident showed adequate visibility with a haze condition. Experience in this area at this time of year has shown that haze conditions produced by smoke from burning fields restricts air to air visibility considerably. This condition, plus the late afternoon sun, resulted in even more restriction. The aircraft was approaching almost into the sun on runway 21. A shadow effect is produced by the instrument panel that makes indicator lights, annunciator lights and instruments difficult to see, even with a directed effort.

"The aircraft ahead, the spacing problem and the possibility of a go-around caused the pilot to be preoccupied with the situation outside the aircraft. These conditions, poor visibility, shadow effect caused by the instrument panel and sun, preoccupation with the aircraft ahead and fatigue resulted in the pilot failing to perform the final landing check and assuming the gear was down.

"The tower was occupied with expediting the lead aircraft clearing the runway during the approach. The controller did issue a gear check, but it was hurried and unclear. The board had to listen to the tape three times to determine what was actually said. . . .

"It was unit policy to fly with only one pilot during VFR conditions due to a lack of assigned personnel. This had been an accepted practice for some time. The fact that the pilot did not have a copilot is considered a contributing factor, even though the possibility to land gear-up with a copilot still exists. However, with a copilot, the probability would be greatly reduced. The absence of a copilot does make efficient use of the checklist for this aircraft very difficult. The failure to use this checklist did contribute to the accident. If a checklist is used as prescribed by section IV, AR 95-4, and the checks performed, it is not possible to land with the gear up."

*Flight surgeon:* "The pilot stated that approximately 2 weeks before the accident he developed a flu-like syndrome manifested by rhinorrhea, nasal congestion, malaise, easy fatigability and coughing. He was medically restricted from flying for a period of 4 days during which he was placed on tetracycline and antihistamine-decongestant tablets. His nasal symptoms lasted 7 days, but he continued to cough intermittantly, primarily during the night. He stated that his coughing affected his sleeping pattern significantly and he reportedly expressed his sleeplessness to his colleagues. This preexisting organic disease process was aggravated by the number of hours spent flying, specifically the 8 hours flown on the day of the accident.

"The most important contributing factor in this accident is the fatigue experienced by the aviator. . . ."

*Report recommendations:* "Command action to increase the authorized personnel to a number that would provide a minimum of pilot and copilot for all operational missions and a unit policy requiring pilot and copilot as a minimum crew.

"Emphasis on the use of the checklist as prescribed by AR 95-4.

"That unit operations monitor mission assignments to avoid committing pilots to repeated tiring missions of this type."

*Reviewing official:* "Concur in the recommendations . . . This headquarters received approval for additional aviators to provide a pilot and copilot for required operational missions. A command aviation operational directive now requires a minimum crew of pilot and copilot on all U-21 missions.

"All crewmembers have been briefed on the mandatory use of the checklist and will be reminded during each safety meeting.

"DA regulations on crew flying time are being complied with. Upon arrival of the additional aviators, individual flying time will be reduced. . . . The flight surgeon has been requested to attend and participate in monthly aviation safety meetings. . . ."

# "I Thought It Was A Cargo Compartment"

UH-1D AC: "I arrived at the aircraft at 0800 and conducted the preflight. I checked all components, including the avionics compartment, although at the time I thought it was a cargo compartment. I checked it for fragmentation grenades, CS grenades and open containers of oil. There were none of these items in the compartment. At 0825 I completed the preflight and we departed at 0830. Approximately 1 mile out we smelled smoke. . . . I noticed a small amount of smoke coming from the left chin bubble area. We immediately turned around. I turned off the inverters and the generator, but left the battery on in order to call the tower. I then started pulling all the circuit breakers, but some of them were stuck and would not come out. All radios were turned off except for the UHF, and we entered a left downwind.

"We were convinced that the only problem was smoke from an electrical source. Just after we turned base, the crewchief said we were on fire. We declared an emergency. The pilot told the tower we had a fire. The tower replied that the crash crew was standing by. It was obvious at this time that the fire had gone beyond the point that trying to isolate it by pulling circuit breakers would do any good. By this time we were on short final and we made a power-on landing. The fire trucks foamed out the fire while we quickly exited the aircraft after shutting down."

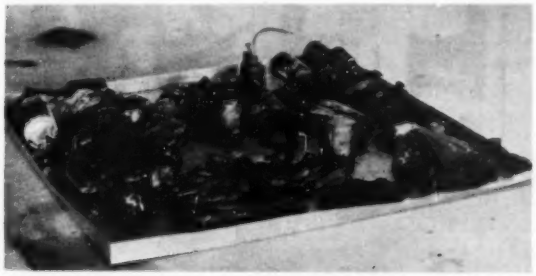
Investigation indicated the fire was probably caused by a can of hydraulic fluid shorting out the nonessential bus bar terminal in the lower left avionics compartment between stations 185 and 220.

*Report findings:* "AC failed to perform a thorough preflight inspection. He should have ordered the removal of equipment from the avionics compartment.

"The crewchief was in error to store equipment in the lower left avionics compartment.

"Command safety channels failed to recognize and eliminate the potentially hazardous condition caused by storage of equipment in the lower left avionics compartment.

"A burned gash in the nonessential bus bar terminal and a corresponding burn in the rim of one of the hydraulic fluid cans substantiated that the fire in the avionics compartment was caused by this short circuit."



Items stored in avionics compartment included two cans of hydraulic fluid, one can of engine oil, one can of transmission oil, one smoke grenade rack (without grenades), one oil can with spout, one can of GOB grease, two MEA vests, one rain jacket, various sizes of nylon tiedown ropes, various sizes of oily rags, a magazine and a can of commercial liquid wax

Hydraulic fluid can caused short at bus bar (arrow) and fire

# Back In For Maintenance

A UH-1H PILOT WAS hovering from the revetment area to the maintenance area for a PMP inspection.

*Pilot:* "I had flown to an area in front of the maintenance tent and put the aircraft down when I was asked to turn it around. I picked up to a hover and used aft cyclic to back away from the maintenance tent. When I thought I was far enough back, I started a pedal turn to rotate 180 degrees. I noticed the wind affecting the aircraft in the turn. Then, just as I thought I had reacted to the wind and neared completion of my turn, the crewchief told me to pull forward and exclaimed I was going to hit the tent.

"The tail rotor struck the top part of the maintenance tent and the aircraft immediately yawed and tipped to the right. I reacted by using left cyclic as the main rotor struck the psp and lowered collective and rolled off throttle. The aircraft made impact with the ground and I shut it down and got out.

"I was aware of the barriers which were the maintenance tent to the rear, stacks of psp and culverts to my immediate left and a creekbed in front of me."

Damages to the tail rotor, 90-degree gearbox, main rotor, main transmission, tail boom, skids and airframe exceeded $82,000.

Tail rotor struck hangar roof (arrow) when pilot attempted hovering turn in extremely confined area

*Report analysis:* "This accident was the direct result of the tail rotor striking the roof of the maintenance tent. Had ground handling wheels been used to move the aircraft, the accident could easily have been avoided. Beside the fact that the area in front of the maintenance tent was too small for the safe operation of aircraft, there were not any 'NO HOVER' lines painted near the hangars to help prevent just such an accident."

The report findings concerning the pilot's failure to recognize the hazardous situation and refuse to hover to the maintenance area were very blunt and best not repeated. These findings also included failure of the maintenance supervisor to use the proper method to move the aircraft from its revetment to his area.

*Report recommendations:* "That the proper methods for moving aircraft be reemphasized to maintenance personnel and aviators.

"That an SOP be established that prohibits the hovering of aircraft within the maintenance area.

"That 'NO HOVER' lines be established for the area around the maintenance hangars."

*Reviewing authority:* "Concur with the findings. However, I disagree with the wording [referenced above] pertaining to crew error. All recommendations have been adopted. . . ."

## NO SMOKING

UH-1H AC: "We were sitting in the POL after refueling. I called the tower for clearance to the runway and was told to hold my position for a UH-1 taxiing into the POL. I held until the other aircraft was hovering over the pad at 4 o'clock to us. We then received clearance to taxi onto the runway.

"The pilot picked it up to a hover and the tail started to turn to the right. He added right pedal and the nose started to turn to the right. Our gunner had told us not to bring our tail to the right, so I figured we were now clear of any barriers. Then I felt a thump and came on the controls. The aircraft started to yaw right and I lowered collective. It hit the ground and tilted down to the rear. I applied full forward and slight right cyclic and tried to roll off the throttle. It would not roll off. I put force trim on, holding the cyclic with my knees, and turned the main fuel off. . . ."

*Report:* ". . . There were two other UH-1H aircraft hovering upwind in the confines of the POL area, approximately 75′ x 75′. The turbulence made control difficult and the tail rotor struck a 'no smoking' sign located on an embankment approximately 10 feet above and 20 feet to the right of the refueling pad. . . ."

Among the findings for this accident was: "Placement of a 'no smoking' sign on high ground that would be level with a hovering aircraft."

# Second Down, Goal To Go

A CH-34C PILOT was assigned a flight to pick up and drop members of a parachute team at a football field. The first jumpers were picked up and the first drop made. Then the approach was started for the second pickup.

*Pilot:* ". . . As I approached the football field for my second pickup, I saw several people waving me off from the parachute target area which was full of collapsed chutes.

"I was prepared to go around when I saw a ground guide a little left of my path motioning me to land in front of him. I also saw another ground guide about 75 to 100 yards to my left, also indicating that I should land in front of him. The first guide seemed inexperienced or confused, probably both, so I landed to a 5-foot hover in front of him and began to hover to the other guide who seemed more experienced.

"The blowing snow caused by the rotorwash was severe and I could only discern the horizon and the ground guide who was wearing a bright orange parajumping suit. I hovered in front of him and, as I turned the aircraft to face him, my tail rotor struck the black and white goalpost which was obscured from my vision by the blowing snow. Upon impact with the goalpost, I performed the standard maneuver for tail rotor failure at a hover, put the aircraft down and shut off the engine and all switches."

Damages to the tail section, rear wheel, one main rotor blade and synchronized elevator were estimated at $28,000.

*Board findings:* "Failure to accurately judge clearance of landing site obstacles and lack of coordination between supported unit and pilot.

"Probable or suspected cause factors included confusion created by two ground guides, one of whom was inexperienced; blowing snow created by rotorwash; and lack of established SOP pertaining to removal of goalposts."

The board recommended establishment of an SOP pertaining to the removal of landing hazards in frequently used landing sites and adequate coordination between supported elements and aircraft commanders.

*Reviewing official:* "Concur with the findings and recommendations of the board. Future flights into the football field have been prohibited. There are no other frequently used landing sites with hazards. All aircraft commanders will insure prior coordination between themselves and personnel acting as ground guides whenever possible. . . ."

*Approval authority:* ". . . This headquarters does not believe the closing of helipads with hazards is necessarily proper corrective action. Corrective action in this case would be to insure that ground personnel know and understand the procedures for guiding helicopters. It is necessary to maintain some communication between ground personnel and aircraft. . . .

"Photographs should have captions pointing out specific items. If a caption is not needed, then the photograph doesn't contribute to the accident report and should be eliminated. . . ."

Goalposts came down before game was over

**L. L. Bishop**
*R&M Control Division,*
*Systems Engineering*
*Directorate,*
*USAAVSCOM*

*Management Tool for the Analysis of Maintenance Performed on Fielded Aircraft*

# THE AIRCRAFT LIFE CYCLE MAINTENANCE AND OWNERSHIP RECORD (TALCMOR)

THE NOVEMBER ISSUE of the AVIATION DIGEST contained an article from the Systems Engineering Directorate at USAAVSCOM entitled "The Aircraft Life Cycle Maintenance and Ownership Record (TALCMOR)." TALCMOR can be developed for each Army aircraft and is simply a historical record of the life cycle of the aircraft. This record begins with acceptance into the Army inventory and includes all maintenance actions performed on the aircraft, transfers of ownership and scrappage or salvage actions which occur during the life cycle. Currently, TALCMORs are available for each aircraft in the AH-1G, CH-47A/B/C and UH-1B/C/D/H/M TMS (type, model, series) fleets and work has been initiated to include aircraft in all TMS fleets in the Army inventory.

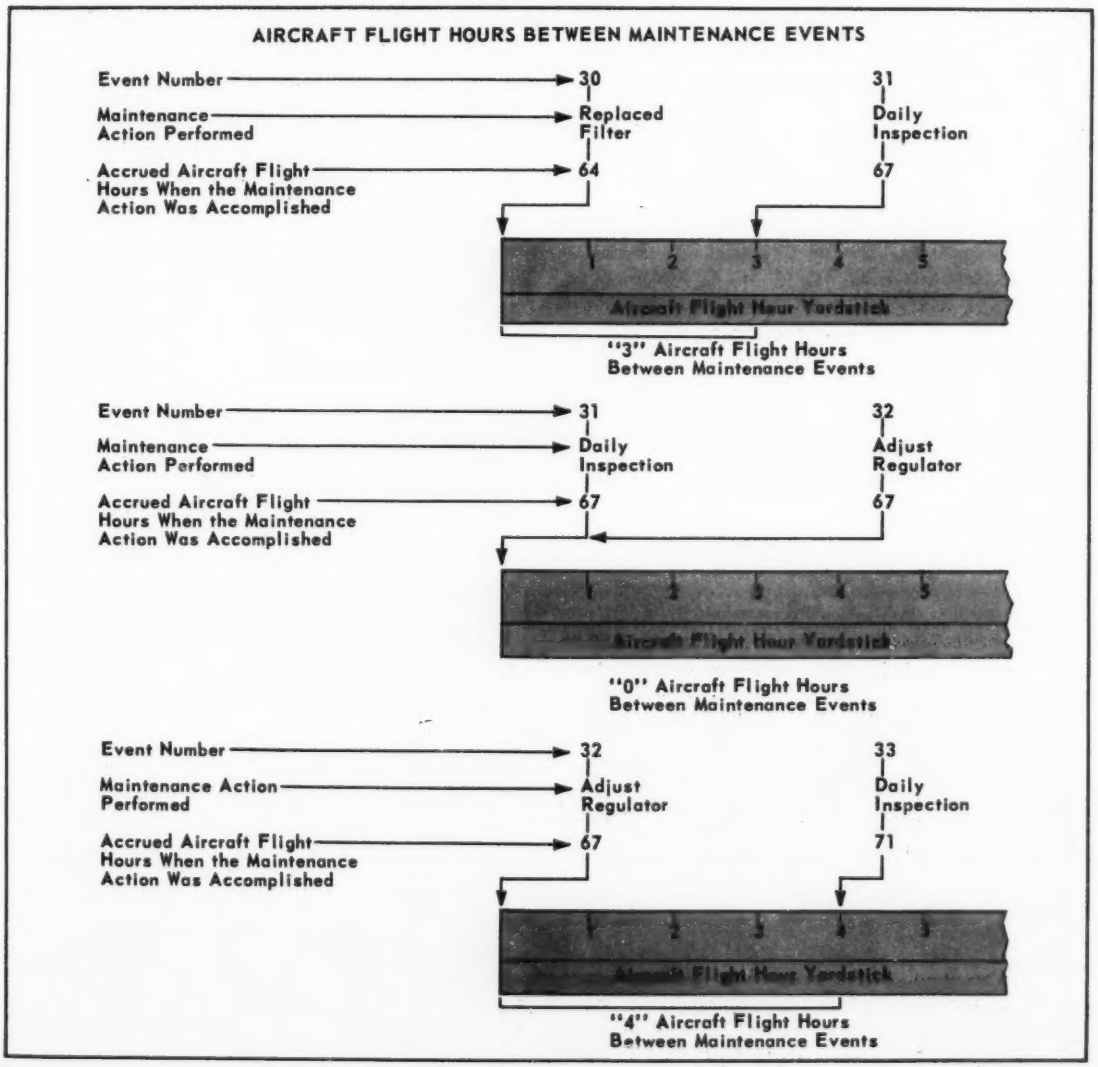
The November article revealed the methods used to align all maintenance actions, reported on 2407 and 2408-3 TAERS forms as being accomplished on a particular aircraft, in the sequence in which they occurred. The article further explained how a TALCMOR is being used as a tool for identifying

and measuring aircraft field experience data and the importance of having complete and accurate records of field experience.

Studies of the TALCMORs and the individual maintenance actions which are included in them have revealed many significant facts of interest to persons supporting the field activities and it is anticipated that field activities will have a mutual interest. This article discusses a few of these significant facts. Additional information and other significant facts will be presented in future issues.

## GAPS IN MAINTENANCE REPORTING

It has long been suspected that all maintenance actions performed on aircraft are not being reported. One of the objectives in the study of TALCMORs was to determine the number of maintenance actions that were reported and the number that should have been reported, but were not. To perform such a measurement, it is necessary to have a *yardstick,* and the *yardstick* most commonly used for measuring maintenance events is aircraft flight hours.



# Much usable information can be supplied to field units with regard to maintenance requirements for their aircraft

It was anticipated there would be numerous maintenance actions occurring with 0, 1, 2, 3, 4, 5, 6 and greater numbers of flight hours between maintenance actions, but it soon became evident that some aircraft had 200, 300, 400 or even as high as 500 flight hours accrued between maintenance actions. After examining many of these periods in the life of aircraft, which revealed a high number of flight hours between maintenance actions, it was established that these high flight hours between events were correlated to the owning unit and the high number of flight hours between events was the result of having no records in the data bank for that period of the aircraft lives.

The unit that reports a maintenance action is identified on the 2408-3 and 2407 forms. When the maintenance actions are arranged in flight order sequence, the reporting unit identification is mated to its respective maintenance actions. Therefore, the unit reporting maintenance before and after a large gap in maintenance reporting is identified. Also, the 2408-7 Transfer Record can be used to identify the owner of an aircraft for all periods in the aircraft's life. When a large number of flight hours between maintenance actions appeared in TALCMORs, a transfer of ownership was also indicated for that interval in the life of the aircraft.

It is desirable to have aircraft that require the minimum amount of maintenance, but there is no aircraft produced today that can fly 200 or 300 flight hours without required maintenance. With Army aircraft, there are established limits about how many hours an aircraft can be flown without maintenance being performed, even though it may be possible from an airworthiness viewpoint for the aircraft to be flown for longer periods without maintenance. When an Army aircraft is flown on one day, it will have at least a daily inspection performed before a flight on a following day. A daily inspection is a maintenance action that should be recorded on a TAERS record.

Examination of many flight records and interviews with seasoned Army aviation officers revealed that no Army aircraft are being flown more than 14 flight hours in one day. To establish a base line which would aid measurements of maintenance reporting, it was decided to establish a limit for aircraft flight hours accrued between reported maintenance actions. If the flight hours between maintenance actions exceeded this limit, it was positively the result of insufficient maintenance action records stored in the data bank for that period in the life of the aircraft, and not the result of it being such a good aircraft that it did not require maintenance very often. If the flight hours accrued on the aircraft between maintenance actions was less than the established limit, it was considered acceptable reporting. But this acceptance gives no assurance that all maintenance actions which should have been reported are stored in the AVSCOM TAERS data bank.

A statistical technique has been developed for determination of nonreporting, but it is not presented in this article. Using the established limit technique for measurement purposes, it was possible to recreate a picture of maintenance action reporting by all echelons of maintenance and show how selected aircraft compare with each other or with the entire fleet.

Based on the 14-flight-hour criteria, a gap in maintenance reporting is said to exist when 14 or more flight hours accrue between reported maintenance actions. The applications of this criteria to TALCMORs of all aircraft in the nine TMS fleets taken collectively resulted in the elimination of 48 percent of the flight hours accrued on the aircraft. In other words, 48 percent of the flight hours accrued during periods of TAERS reporting were accumulated during periods in which maintenance was not being reported. Therefore, 52 percent of the reported flight hours were usable for determining the frequencies with which various types of

maintenance are required. Since 48 percent of the reported flight hours contained no reported maintenance, at least 48 percent of the actual maintenance performed was either not reported or was reported but not stored in the AVSCOM TAERS data bank.

## INVALID AIRCRAFT SERIAL NUMBERS

The aircraft flight hours between maintenance events was measured on 5,872 aircraft which had a total of 2,197, 443 maintenance action records stored in the data bank. Actually, there were 2,235,995 maintenance actions stored in the AVSCOM TAERS data bank for these 5,872 aircraft, but 38,512 of them could not be used because it was not possible to determine which aircraft had the maintenance actions. Aircraft serial numbers recorded on the 2408-3 and 2407 forms which were used to report the 38,512 maintenance actions did not match the serial numbers of any aircraft in the Army inventory. Of these, 19,592 maintenance actions were recorded on the 2408-3 form and 18,920 recorded on 2407 forms. The maintenance actions with invalid aircraft serial numbers represented 1.7 percent of all maintenance actions stored in the data bank for the nine TMS fleets.

## DELETED FLIGHT HOUR ENTRIES

Examination of TALCMORs revealed that many aircraft had a few maintenance actions with no aircraft flight hours recorded on the forms and a few aircraft had numerous maintenance actions with no aircraft flight hours recorded on the forms. On the 2408-3 form, aircraft flight hours are recorded for each maintenance event. However, on the 2407 form, aircraft flight hours are recorded once on the form and all maintenance actions recorded on the form are assumed to have been accomplished during that one maintenance interval at the support or depot maintenance activity. The absence of an aircraft flight-hour value on the 2407 form results in no flight-hour value for any maintenance action recorded on the form. There were 1,788 aircraft that had a total of 50,647 maintenance actions (2.3 percent of the total) recorded without a flight-hour value. Of these 50,647 maintenance actions, 3,710 were reported on 2408-3 forms and 46,937 were reported on 2407 forms. The higher number of maintenance actions reported on 2407 forms with no aircraft flight-hour entries reflects the effect of multiple maintenance actions being reported for one flight-hour entry.

## ERRONEOUS FLIGHT-HOUR ENTRIES

Because of some high flight-hour values recorded as the accrued flight hours on aircraft when particular maintenance events were accomplished, a close examination was made of the actual accrued aircraft flight hours. It was determined that no aircraft had accrued 6,000 flight hours to date. In fact, the high time aircraft were UH-1Bs and had between 4,000 and 5,000 accrued flight hours. As a result of this examination, a 6,000-flight-hour limit was established for identifying unreasonably high flight-hour values which were recorded at the time of maintenance accomplishment. There were 6,499 maintenance actions (0.3 percent of the total) recorded with flight hours in excess of 6,000 as being the time of accomplishment. All of these actions were reported as being accomplished on 930 of the 5,872 aircraft being evaluated. Of the 6,499 actions, 2,577 were recorded on 2408-3 forms and 3,922 were recorded on 2407 forms. The effect of multiple maintenance actions being recorded for one aircraft flight-hour entry is responsible for the larger number of 2407 reported maintenance actions with unreasonably high flight hours.

## TYPES OF MAINTENANCE ACTIONS

Analyses of maintenance action types by TALCMORs indicates that daily inspections have been reported under a number of different action codes, thus distorting the frequency of occurrence for some of the action codes. This reflects the fact that there is a need for guidance in the field about which maintenance actions should be charged against each action code. These analyses also pointed out the fact, that, except for inspection-type maintenance actions, most of the maintenance is being performed at higher echelons. The ratio of scheduled to unscheduled maintenance appears to be higher than expected. Approximately 50 percent of the total maintenance actions performed were scheduled maintenance and about 58 percent were identified as being inspection-type actions.

## USE OF TAERS DATA

The preceding paragraphs have presented some of the types of errors which exist with TAERS data. These errors seriously limit the usefulness of TAERS data in general. However, through analyses of TALCMORs, techniques have been developed to overcome many of the difficulties to a degree. By using the 14-hour gap criteria and other computer techniques, methods have been developed which

enable realistic frequencies for various types of maintenance requirements to be calculated. The development and application of these techniques require the expenditure of large amounts of computer time and manpower resources. However, through their application, much usable information can be supplied to field units with regard to maintenance requirements for their aircraft. This type of information will be reaching the field shortly. It is assumed that once the field units become aware of the usefulness of the data which they report, the quality of TAERS reporting will improve. As the quality of reporting improves, the amount of useful information which the field receives in return will increase. Also, as the quality of reporting increases, problems with fielded equipment can be diagnosed and eliminated in a more timely manner.

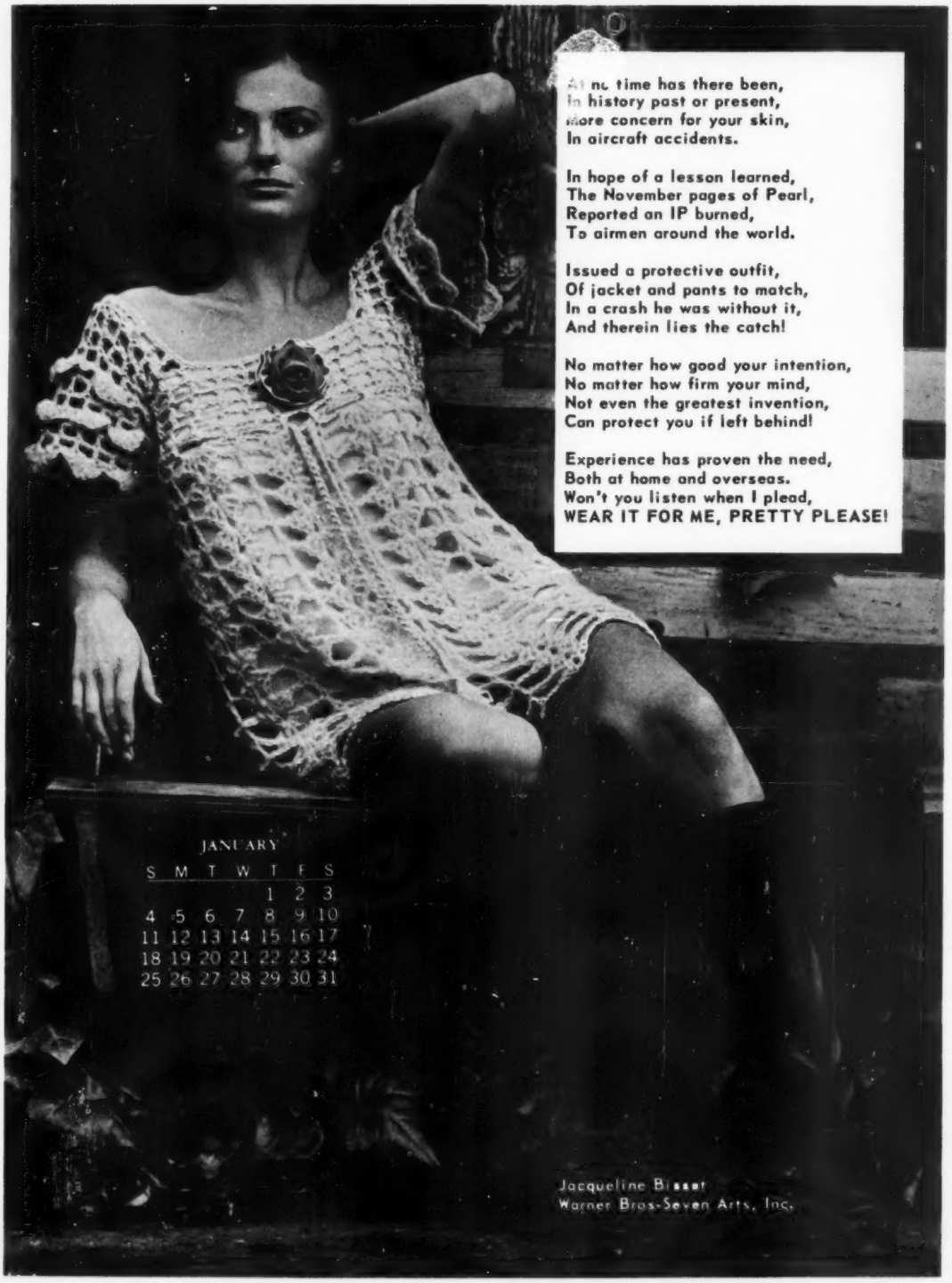
With the flight-hour *yardstick* corrected for gaps in maintenance reporting, it is possible to calculate numerous measures that are used in the analyses of maintenance requirements and their impact on support resources. The more common types of maintenance measures are:

- Man-hours per flight hour
- Mean time between failures
- Mean time between replacements
- Mean time between unscheduled maintenance

All personnel assigned to maintenance-related duties are aware of the numerous maintenance actions recorded on the 2408-3 and 2407 forms. This data is extremely valuable for decisionmaking in numerous areas. A few of the more familiar are:

- Inputs for establishing TBOs
- Product improvement program (PIP) tasks
- Scheduling of maintenance events
- Determining manpower and training requirements
- ECP (Engineering Change Proposal) and MWO applications
- Parts stockage levels
- Special tooling and support equipment requirements
- Optimum cyclic overhaul intervals

This list could continue on and on, but it is obvious from those presented that TAERS data is useful in all aspects of equipment maintenance and management.


At no time has there been,
In history past or present,
More concern for your skin,
In aircraft accidents.
In hope of a lesson learned,
The November pages of Pearl,
Reported an IP burned,
To airmen around the world.
Issued a protective outfit,
Of jacket and pants to match,
In a crash he was without it,
And therein lies the catch!
No matter how good your intention,
No matter how firm your mind,
Not even the greatest invention,
Can protect you if left behind!
Experience has proven the need,
Both at home and overseas.
Won't you listen when I plead,
WEAR IT FOR ME, PRETTY PLEASE!
JANUARY
S M T W T F S
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31
Jacqueline Bisset
Warner Bros-Seven Arts, Inc.

# PEARL'S

## personal equipment and rescue/survival lowdown

Dear Pearl:

We have a problem with our *chicken plates!* The chest protector, FSN 8470-926-1574, can be a dangerous piece of equipment in an aircraft accident. It seems they tend to ride up and strike the pilots in the face or chin. Not only does this happen in accidents, but a hard landing will give the same effect. Once I cut my chin when I sneezed and my chin hit the top edge of my chest protector.

Why doesn't someone modify the strapping system and put some padding on the top edge?

CW2 Richard M. Weiland Jr.
Aviation Safety Officer
11th Combat Aviation Bn

Dear Mr. Weiland:

The problem you described with your *chicken plates* has been recognized and the developing agency is aware of it. I am sending a copy of your letter to them for information.

The newest armor carrier has approximately ¼-inch of ballistic nylon felt padding in the armor plate pocket. This provides pretty good padding to the armor plate and protection for the wearer.

Extensive testing to determine the crashworthiness of aircrew protective armor established that there is a significant advantage to tightly worn armor and occupant restraint harness over that worn loosely. Worn tightly, the armor did not flay around the neck and face area, especially during vertical impacts. In view of the testing, I recommend you wear your body armor and restraint harness tight around the body.

Pearl

## If you have a question about personal equipment or rescue and survival gear, write

Dear Pearl:

I certainly enjoy the DIGEST each month and am especially interested in developments in personal survival equipment. I can use a little information.

I'm flying in Germany now and some of the policies puzzle me. In a letter dated 5 February 1969, Headquarters, 15th Aviation Group, the wearing of flight suits is prohibited, except for special missions, such as border surveillance, etc. What this boils down to is 90 percent of the Group will not wear flight suits. Fatigues are to be treated, but this is like driving a 1927 Ford when 1969 models are available free. I'm certain the Army has spent millions developing and testing flight equipment for efficiency as well as for the safety of flight crews. Why then is the decision to use or not use this equipment left to the decision of subordinate commanders?

Even more alarming, however, is the fact that with this attitude, safety and convenience will fall in line behind appearance and the old *tin soldier* uniformity will spread. So we find ourselves flying with marginal equipment in marginal weather and wearing field jackets and fatigues for field problems and alerts because flight equipment (i.e., flight suits and flight jackets, etc.) are not authorized. When are we going to become professional toward aviation in the Army?

I am a real fan of safety gear. Anything that will increase my chances of telling *war* stories to my grandchildren, I say *USE IT*. Pearl, how can we convince senior commanders that it is, in fact, our lives they are playing games with?

CPT Harry Flare
15th Aviation Group (Combat)

Dear Captain Flare:

I'd like to answer your questions in reverse order. The Institute of Aerospace Safety and Management at the University of Southern California conducts a Commanders and Staff Officers Aviation Safety Orientation Course, monitored by USABAAR, which stresses not only the usefulness of Army aviation assets, but also the limitations involved and the responsibilities of the commander to his aviation resources. Hopefully, this education of senior nonrated personnel will help to halt the spread of the attitude you mentioned. However, aviation commanders, staff aviation advisors, and even individual aviators have a certain responsibility for educating their nonrated superiors.

Until such time as Nomex flight suits become available worldwide, USABAAR recommends the unstarched K2B flight suit treated by the process described in the Pearl section of the December 1967 issue of the AVIATION DIGEST; in Army training film TF 46-3605, entitled "Dress to Live"; and on page 17 of the 1968 edition of the Aircraft Accident Prevention Survey. It should be pointed out to your commander that even treated fatigues will support a flame if they are heavily starched.

I'm with you, Captain Flare, on the use of all available personal protective gear and maybe someday its use will be directive in nature. We're working on it!

Pearl

P.S. Some of my coworkers don't believe you exist. They say you are putting us on, mainly because you didn't give us a service or Social Security number, didn't identify your duty position, signed your name with a script that looks like a right-hander writing left-handed and because they couldn't find any record of a 759 for you. Tell me they're wrong, Harry.

Dear Pearl:

What is the status of the APH-6 ballistic helmet? We here in Vietnam are waiting anxiously for the promised protection, but we've only received a token amount.

How about the survival vests? I get tired watching Army aviators limp around airfields wearing the cumbersome leg survival kit (when available!), while I see Air Force types looking very dapper in their Ivy League survival vests.

By the way, you have an open invitation to dinner. Any time you're in the neighborhood, drop in.

1LT John S. Hamilton
Safety Officer
214th Combat Aviation Bn

Dear Lieutenant Hamilton:

The status of the APH-6 is that it does not exist in the U.S. Army inventory. The Helmet, Flying, Crash Ballistic Resistant, Nylon Outer Shell, Green, designated AFH-1, provides limited protection from fragments but increases the gross weight of the helmet by one-half to one and one-half pounds, depending on size. Approximately 14,500 AFH-1 helmets were shipped to SEA. I'm sure your supply personnel can get one for you.

Pearl, U.S. Army Board for Aviation Accident Research, Ft. Rucker, Ala. 36360.

In the meantime, the next generation helmet is on its way. Extensive testing by the Aeromedical Research Laboratory indicated that increasing the weight of the helmet had a derogatory effect on retention during a crash sequence. As a result, the SPH-4 was developed and is presently being procured for SEA. The first 900 were delivered to the Army 18 July and deliveries will continue at the rate of 1,000 to 2,000 per week. The SPH-4 offers the distinct advantages of being lighter weight, cooler, more comfortable, with improved retention and sound attenuation.

Procurement of the Leg Survival Kit has been cancelled and a contract let for procurement of the SRU-21/P Survival Vest, used by the Air Force, with one pocket enlarged to accept the URC-68 radio. This should put you in the same Ivy League with your dapper Air Force colleagues.

Thanks for the dinner invitation. I'll look forward to dinner at the REX the next time I'm out your way.

Pearl

Dear Pearl:

Please let me have the stock number of issued clip-on knee boards.

MAJ Stephen J. Shader Jr.
Hq, 121st U.S. Army Reserve Command
Birmingham, Ala. 35222

Dear Major Shader:

At the present time there are two standard pilot's clipboards. Either is authorized on a basis of issue of one per aviator by TA 50-901. The larger one is: 7520-082-2636, Clipboard, Pilot's MXU/5P. The smaller one is: 7520-813-7461, Type Mark 2A, Pilot's Clipboard.

Pearl

Dear Pearl:

We would appreciate information concerning Nomex fire retardant flight suits, particularly supply source, prices, availability, etc. Thank you.

Leo J. Riordan
Project Safety Officer
Bureau of Reclamation
Department of the Interior
Montrose, Colo. 81401

Dear Mr. Riordan:

Military flight suits, the only garments with which I am familiar, would have to be obtained through the Department of Defense. There are three different garments in use by the military:

Navy—one-piece 3.3 oz/yd$^2$—approximate cost $37.00

Army—two-piece 4.4 oz/yd$^2$—approximate cost $48.00

Air Force—one-piece 4.0 oz/yd$^2$—approximate cost $38.00

I cannot predict the availability of these, but they are all currently under procurement.

There are various commercial firms which merchandise Nomex underwear as well as other fire retardant garments, but I do not know of any which offer flight suits. Therefore, I refer you to Mr. Fred Miller, Textile Fibers Department, E. I. DuPont de Nemours, Inc., Wilmington, Del. DuPont is the sole source of Nomex fiber and, while not in the garment business, they will surely know of any commercial firms who are.

Pearl

Dear Pearl:

Request any information pertaining to Arctic survival. Please include FSNs and requisitioning authority for any Arctic survival kits presently in the supply system.

CPT Gary M. Lewandowski
Safety Officer
19th Aviation Battalion

Dear Captain Lewandowski:

There are two survival films available through the USABAAR library applicable to Arctic survival. SF 20-246, entitled "Stay Alive in the Summer Arctic" (26 minutes, sound, black and white) and SF 20-250, entitled "Stay Alive in the Winter Arctic" (23 minutes, sound, black and white). Both were produced by the National Film Board of Canada. Requests for the use of these films should be addressed to Education and Prevention Department, USABAAR, Ft. Rucker, Ala. 36360. Advance notice is essential to assure availability.

The Survival Kit, Cold Climate, Individual (FSN 8465-973-1862) and Survival Kit, Cold Climate, OV-1 Aircraft (FSN 8465-782-3003) are the only survival kits in the Army inventory specifically authorized for use in the Arctic. Both are listed in SB 700-20 and authorized by CTA 50-901.

Pearl

# USAASO Sez

## The U. S. Army Aeronautical Service Office discusses

Flying in restricted areas
Dangers in alert areas
Controlled firing areas

**On Restricted Areas: A restricted area is a block of airspace within which no person may operate an aircraft during the time of designation unless advance permission has been received from the using agency or the controlling agency. In the case of a Restricted Area/Military Climb Corridor, the controlling military air traffic control facility must be contacted for permission for transit through the climb corridor.**

**Aviators, planning a VFR flight, should be aware of altitude and time restrictions of any restricted areas along their flight path. The flight may be shortened considerably and safely by flying over or under, altitude permitting, or flying through when the restricted area is open. Of course, aviators should be aware of these restrictions if for no other reason than to remain clear when the area is active. Inadvertent flying into an active restricted area could shorten a flight tragically.**

**On Alert Areas: Aviators flying in an alert area are cautioned that they are not alone. Alert areas are established to inform aviators of specific areas wherein a high volume of aviator training or an unusual type of aeronautical activity is conducted. Specifically, the establishment of an alert area DOES NOT:**

- **Prevent other aircraft, civil or military, from flying within the designated area.**
- **Impose any communication requirements on aviators flying into or within the designated area.**
- **Relieve pilots of participating aircraft or transiting aircraft from the responsibility for collision avoidance.**

**On Controlled Firing Areas:**

**What is a controlled firing area? Simply a portion of air space with defined dimensions (horizontal and vertical) in which ordnance is expended by a responsible using agency during designated periods and under controlled conditions which eliminate hazards to the flight of nonparticipating aircraft. These areas are described in NOTAMs and normally are not shown on aeronautical charts. Look for the 10 December 1969 issue of TB AVN 1-681, Army Aviation Flight Information Bulletin, for a complete listing of CONUS controlled firing areas.**

**VISITORS to the U. S. Army Aviation Museum (right) now can see one of the first helicopters produced for any of the armed forces in other than experimental quantities. One hundred of the Sikorsky R-4B helicopters were contracted for in 1943. In the same year the R-4 became the first helicopter used for medical evacuation. It was used regularly in support of troops fighting in North Burma.**

**The recently acquired R-4B is on display at the Ft. Rucker facility through an indefinite loan from the Air Force museum and can be seen between the hours of 0900 to 1600 Monday through Friday and 1300 to 1700 Saturday and Sunday.**

**One of the first visitors to see the R-4B was Colonel J. Y. Hammack, Chief of Staff of the U. S. Army Aviation Center, who received an informal helicopter transition training course in an R-4B at Randolph Sub Base, San Marcos, Tex., and at Sheppard Field, Tex., in 1946. Lieutenant Colonel (Ret.) William A. Howell, museum curator, and COL Hammack, seated in the aircraft, are seen in the photo above.**

# MUSEUM GETS "OLD-TIMER"

GIFTS OF
EXPERIENCE
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